

HORTICULTURAL ABSTRACTS.

VOL. XII.

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No. 1.

Initialled abstracts in the present number are by W. A. Roach and H. Wormald of the East Malling Research Station.

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Horticultural Abstracts

Vol. XII

March, 1942

No. 1

MISCELLANEOUS.

Propagation.

1. WHINNETT, S. 581.057 : 581.14
Moon-phase sowings.
Gdnrs' Chron., 1941, 110 : 223.

The author supports, from experience gained in exhaustive trials during 1932 and 1933, the recent findings of the John Innes Horticultural Institute that sowing according to the phases of the moon has no noticeable effect on the resulting crop.

2. FARRAR, J. L., AND GRACE, N. H. 631.535 : 634.975
Vegetative propagation of conifers. X. Effects of season of collection and propagation media on the rooting of Norway spruce cuttings.
Canad. J. Res., 1941, 19, Sec. C, pp. 391-9, bibl. 13.

Norway spruce cuttings were taken at fortnightly or monthly intervals from July to April and were propagated in outdoor frames in several media. The proportion of cuttings rooting in sand was low for the summer collections but reached 80% or higher for the September and October collections. The addition of sedge peat was helpful in promoting root growth and it proved superior to sphagnum peat in this respect. Varying the proportion of peat or texture of sand had no significant effect except on root length, which was greater in the media rich in peat. Cuttings stored over winter or taken in spring did not respond well.

3. MÖBIUS, M. 631.532/541
Die vegetative Vermehrung der Pflanzen. (Vegetative reproduction of plants.)
Bot. Zbl., 1940, 34 : 321.

*Growth substances.**

4. AVERY, G. S., JR., BERGER, J., AND SHALUCHA, B. 577.15.04
The total extraction of free auxin and auxin precursor from plant tissue.
Amer. J. Bot., 1941, 28 : 596-607, bibl. 21.

Two outstanding methods of auxin extraction from the tissues of higher plants are discussed : (1) the multisolvent method or successive extraction of the same batch of tissue with several different solvents (ethanol-chloroform-water) ; (2) extraction with water alone as a solvent. These investigations are described as further studies whereby yields have been increased to 20 times those previously reported from the same laboratory (Department of Botany, Connecticut College, U.S.A.).

5. BRAIN, E. D. 577.15.04 : 581.192
A straight-growth method of auxin determination in plants.
Nature, 1941, 148 : 666-7, bibl. 1.

A method of estimating auxin in plants is discussed which, while it cannot yield such exact quantitative results as the *Avena* method, is useful in comparative work and very much less exacting as regards technical perfection and equipment. The method, in brief, is to apply pieces of the plant material to be tested to the top of cut pea shoots grown in light until 3 or 4 inches high. The technique is fully described including attempts to attain some system of standardization for the evaluation of results.

* See also 76-79.

6. GUTHRIE, J. D. 577.15.04 : 581.144 : 634.1/2

A preparation from yeast that is active in breaking the rest period of buds.

Contr. Boyce Thompson Inst., 1941, 12 : 195-201, bibl. 13.

The findings* of Bennett, Oserkowsky and Jacobson that a yeast extract much more active than glutathione will break the dormancy of pear buds were confirmed. A procedure is detailed for obtaining such an extract. The extract contained adenine, pentose and phosphorus. It is recommended that the effect of adenine and adenine-containing nucleotides on dormant buds should be further investigated.

7. ZIMMERMAN, P. W., AND HITCHCOCK, A. E. 577.15.04

Formative effects induced with β -naphthoxyacetic acid.

Contr. Boyce Thompson Inst., 1941, 12 : 1-14, bibl. 10.

The venation pattern and form of leaves of various plants were modified when solutions of naphthoxyacetic acid and its derivatives were sprayed on the growing tips of the plants. The modifications only occurred on growths made after the plants had been treated. Fully formed leaves showed the usual responses to physiologically active compounds (epinasty and swelling of tissues). Similar results were obtained when the plants were exposed to the vapours of naphthoxyacetic acid and with greater and more lasting effect when solutions of this substance were applied to the soil. Spraying tomato flowers with solutions or emulsions of the substance induced parthenocarpic development of fruit. Such fruit was considerably sweeter in taste than normal seeded fruit. Naphthoxyacetic acid has several advantages over other substances in the practical production of seedless fruit, e.g. it can be used without preliminary emasculation of the flowers. Parthenocarpic sweet cherries have also been induced by spraying the buds with this substance.

8. COPISAROW, M. 631.82

Certain growth-promoters and fertilisers. I. Calcium carbide and ferrous ammonium sulphate.

J. Soc. chem. Industr., 1941, 60 : 245-7, bibl. 12.

1. The composite activity of calcium carbide is determined by its decomposition products—acetylene and calcium hydroxide. 2. The nutritive, stabilizing and phytohormone-like function of calcium carbide places it in an intermediate position between natural and artificial fertilizers. 3. The utility of calcium carbide as a fertilizer is dependent on environmental conditions. Beneficial in the case of heavily manured sour soil, it approaches lime in its effect on neutral rough pasture land, whilst in the case of moorland it exerts a detrimental influence. 4. Calcium carbide induces variegation of non-leguminous plants which is restored to normality by ferrous ammonium sulphate, itself an excellent fertilizer for meadow grasses. [Author's summary.]

Growth phenomena.

9. BORKOVSKAJA, V. A. 575.255/257

Graft hybrids and chimaeras. [Russian.]

Vernalisation, 1941, No. 1 (34), pp. 78-83.

The experiment, which is the subject of the article, was made on unspecified dates in 1939 and 1940 at the Institute of Plant Breeding and Genetics, Odessa. Its purpose was to procure shoots from modified tissues at the union of the stock consisting of the tomato variety, Stofert, at a stage of growth marked by 5 to 6 leaves and the scion, *Solanum nigrum*, at the stage of growth marked by 2 to 3 leaves. Having united, the graft was cut through at the point of union in such a way as to retain on the surface of the cut the tissues of both scion and stock. All side shoots were removed from the stock, 3 to 4 leaves being left for photosynthesis. In order to keep the surrounding atmosphere moist the cut surface was covered with a glass protector. The plant was then placed under suitable conditions of light, temperature and manuring. After 20 to 30 days young shoots appeared from the surface and even from either side of the cut. Most of them manifested no changes visible to the eye. With a view to rooting, only those shoots which plainly showed changes were left growing, the others being removed. From 4, out of 10 graftings in all, 7 hybrid shoots were obtained. They were of two types: one inclined

* *Amer. J. Bot.*, 1940, 27 : 883-7, *H.A.*, 11 : 344.

towards the tomato though possessing characters resembling those of *S. nigrum*, the other exhibited reverse tendencies, i.e. it inclined towards *S. nigrum* though possessing characters resembling those of the tomato. Thus proof was forthcoming that by the method of grafting described it was possible to procure hybrids of remotely related parents. The conclusions reached were as follows :—(1) After grafting, cells which have formed at the union of the scion and the stock are quicker to change than cells formed farther from it, for it is here that they are least able to choose conditions of existence natural to them. (2) Old tissues of the scion or stock which have been formed on their own roots and receive nutrients not directly from the stock but through intervening tissues, change less and more slowly. But the accumulation of changes in the young shoot, which has grown from such tissues as a consequence of grafting by the method described, may be greater than any resulting from grafting by the usual method, the reason being that the removal of the nutrients on which the scion relies places the shoot, which is just beginning to establish union, in the greatest possible dependence upon the nutrients of the stock. (3) For the purpose of rapidly bringing about marked changes in the plant through the instrumentality of the stock the special method described of growing the shoot from the point of union of the scion and the stock is the most effective known. The changed plants which resulted from the grafting of *S. nigrum* on the tomato variety, Stofert, were "hybrid mixtures", proof of which was the intermediate nature of their characters, all of which exhibited the peculiarities of both scion and stock, and also the sterility to their own pollen which is a condition typical of the first generation of sexual hybrids of remotely related parents. It should be added that the shoots which were not kept for experiment and which had also received their nutrients from the stock had undergone some change, though it appeared to be small. It was not doubted that, if their progeny were carefully nursed by repeated graftings, hybrids similar to those which were the subject of the experiment could be produced. Further work with the hybrids obtained will be directed towards overcoming their sterility and studying the resultant seed progeny in the hope of disproving finally the chimaera hypothesis.

10. MENDIOLA, N. B.

575.252

Behavior of some hidden bud variations.*Philipp. Agric.*, 1941, 30 : 439-64, bibl. 11.

The author considers a bud variation as "hidden" if it exists in some latent form. The evidence obtained in his trials reported here lends support to a method of plant improvement based on the utilization of hidden and traumatic bud variations and involving asexual propagation with increased number of asexual generations and propagating units. Cases of hidden bud variations are reported and discussed in the following plants :—rice, banana, cassava, marang (*Artocarpus odoratissima*), tradescantia, *Phytodendron* sp., ornamental canna, bignonia, and squash (*Cucurbita maxima*).

11. STRUCKMEYER, B. E.

581.44 : 581.145

Structure of stems in relation to differentiation and abortion of blossom buds.*Bot. Gaz.*, 1941, 103 : 182-91, bibl. 7.

The plants used were soybean, *Salvia*, *Cosmos* and *Xanthium*, all short day plants.

12. BLOCH, R.

581.143.5

Wound healing in higher plants.*Bot. Rev.*, 1941, 7 : 110-46, bibl. 200.

The reviewer deals with theoretical and practical aspects of wound healing in higher plants. In the first part he discusses more or less related studies on wound healing in plants of different structure and reactivity under different conditions. Results on stems, roots, leaves, fruits, etc., show that metabolic activities and the quality of the protective tissues formed are correlated with mode of growth and manner of distribution of meristematic zones and cell layers. The age of the plant and seasonal variations affect wound healing. In the second part he considers in more detail the phenomena of meristematic activity, dedifferentiation, cell division and growth and cell and tissue redifferentiation. (Dedifferentiation = process by which mature or specialized cells lose their differentiated character and rejuvenate. Redifferentiation = physiological and structural differentiation of dedifferentiated cells.) The exact nature of the traumatic stimulus

and of the physical and physicochemical changes in wounded cells is still unknown. Recent research on wound hormones is discussed. Cell division is always parallel to the surface of the wound or internal centres of necrosis in the early phase of wound tissue activity. Cell growth becomes more prominent in humid and stagnant atmosphere. In developing young organs differentiation may become inhibited in cells abutting on the injury, but it is usually promoted in cells farther away. The process of differentiation and restoration of anatomical features near the wound surface appear to be largely a result of metabolic and microchemical changes and of oxidization and condensation processes in the cells similar to those occurring under normal differentiation of the organ. Anomalous tissue structures induced by the application of growth substances to wounds and other plant tumours of chemical and bacterial origin are discussed and their relationship to wound structures noted.

13. JULIANO, J. B. 631.541.1

Callus development in graft union.

Philipp. J. Sci., 1941, 75: 245-54, bibl. 9.

The importance of the rôle of the cambium is over-emphasized even in the most modern textbooks. Evidence is presented to show that before union between a stock and scion in cleft grafting in *Nothopanax* spp. (selected because of the ease with which they can be studied) callus cushions are first formed in the gap through the activity of the parenchyma of both bark and pith and the ray cells of both symbionts. From this callus a cambial bridge is derived joining the cambial ends of the stock and scion. Initiation of callus tissue began with the stock but the contribution of callus by stock and scion was approximately equal. Callus development was usually initiated first in the bark where proportionately more callus tissue was formed which greatly infiltrated the gap between the two symbionts. [From author's summary.]

14. MURNEEK, A. E. 581.162: 581.175.11

Sexual reproduction and the carotinoid pigments in plants.

Amer. Nat., 1941, 75: 614-20, bibl. 21.

The author deals in turn with carotinoids in soybean, crocin in *Clamydomonas*, carotenes in fungi and carotinoids in higher plants.

15. ZSCHEILE, F. P. 581.175.11

Plastid pigments.

Bot. Rev., 1941, 7: 587-648, bibl. 330.

In this review of the field of plant pigments most emphasis is placed upon physical and photochemical properties and upon their significance for a better understanding of the function and behaviour of the green and yellow fat-soluble plastid pigments. Photometric analytical methods are stressed because of the recent rapid growth of interest in their application to physiological problems.

16. (JENSEN, C.) 631.531: 612.014.44

Light and the life of seeds.

Gärners' Chron., 1941, 110: 141.

A brief summary is given of a paper by C. Jensen,* senior partner of the Copenhagen seed firm of J. E. Ohlsens Enke, in which it is shown that the life of many kinds of vegetable seeds may be prolonged by exposure to light from Quartz and Sollux lamps playing together for an hour on the dry seeds. Some results with seeds light-treated a year after harvesting are as follows. Cauliflower 8 years after treatment gave 85% germination, untreated 50%; cabbage, treated 92%, untreated 75%; parsnip after 3 years, treated 80%, untreated 50%; onions in year of harvesting germinated 84%, 3 years later the untreated gave 66%, the treated 82% germination. Leeks treated immediately after harvest while the seeds were still in the seed heads had their germinating capacity raised from 39% to 79%. The need for large scale research on this question is pointed out.

* Jensen, C. Is it possible that seeds through treatment with light may keep their germinating power through a longer span of years than normal? [? translated title.—Ed.]. J. D. Quest and Komp, Copenhagen, 1941.

17. ALLARD, H. A., AND GARNER, W. W. 612.014.44
Responses of some plants to equal and unequal ratios of light and darkness in cycles ranging from 1 hour to 72 hours.
J. agric. Res., 1941, **63**: 305-30, bibl. 5.

The plants studied were soybean, zinnia, spring wheat, *Rudbeckia bicolor* and dill. Temperatures were maintained at 77° F. with a relative humidity of 60%. The pots rested on counterpoised balances and distilled water was added to compensate for water loss each day. The ratios of light to darkness used were 1 : 3, 1 : 2, 1 : 1.4, 1 : 1, 1.4 : 1, 2 : 1 and 3 : 1, the control being 1 : 1, or alternating 12 hours light and 12 hours darkness. Cycles as short as 1 hour and as long as 72 hours were used. The outstanding result was that in most cases the same ratios of light and darkness did not give the same behaviour for any particular plant. The ratios studied all produced characteristic effects, depending on the species, its day-length requirements and the absolute length of the cycle used. Increase of growth and the production of dry matter may be associated with increase of the light interval in two contrasting conditions. In the one dry matter increased where the total light received in the course of the experiment was also increased, as in the case of unequal ratios of light and darkness in the same cycle. In the other, the dry matter increased where equal ratios of light and darkness were maintained in cycles increasing in length, that is, where the total amount of light remained the same during the course of an experiment. [From authors' summary.]

18. REID, M. E. 577.16 : 581.144.2
Relation of vitamin C to cell size in the growing region of the primary root of cowpea seedlings.
Amer. J. Bot., 1941, **28**: 410-5, bibl. 13.

WHITE, P. R., AND BRAUN, A. C. 632.314
Crown gall production by bacteria-free tumor tissues.
Science, 1941, **94**: 239-41, bibl. 5.

NAYLOR, F. L. 612.014.44
Effect of length of induction period on floral development of *Xanthium pennsylvanicum*.
Bot. Gaz., 1941, **103**: 146-54, bibl. 5.

SINNOTT, E. W., AND BLOCH, R. 576.314
The relative position of cell walls in developing plant tissues.
Amer. J. Bot., 1941, **28**: 607-17, bibl. 17.

CHAMBERS, R., AND BLACK, M. 635.25 : 576.312
Electrolytes and nuclear structure of the cells of the onion bulb epidermis.
Amer. J. Bot., 1941, **28**: 364-71, bibl. 5.

Plant nutrition.

19. DOUGLAS, F. C. R. 631.454
Economic aspects of the humus deficiency.
Fruitgrower, 1941, **92**: 3-4, 299-300.

Abstract of a paper read before the Society of Arts in London and printed in full in *J. roy. Soc. Arts*, 1941, **89**: 572-86, including discussion.

20. COLLANDER, R. 581.11/13
Selective absorption of cations by higher plants.
Plant Physiol., 1941, **16**: 691-720, bibl. 25.

Phanerogams representing different ecological types were grown in complete nutrient solutions containing several cations in equivalent amounts. After 2 months their cation composition was determined. The cations most closely studied and reported on were Na, K, Rb, Mg, Ca, Sn, and Mn. Li and Cs were also studied and Cu was noted cursorily. The findings, which are studied in detail, indicate in general that the differences between plant species cultivated in a given solution are very unequal as regards the different cations. The differences are, for the most part, truly specific in character. The specific differences between the absorption characters of different species are so great that it is impossible to arrange the absorption of the cations

studied in any certain order valid for all the species examined. The effect of the presence of certain cations on the absorption of others is often very large.

21. ALBRECHT, W. A. 631.811.4
Plants and the exchange calcium of the soil.
Amer. J. Bot., 1941, 28: 394-402, bibl. 15.

The benefit of liming in soil comes from the introduction of the element for plant use and not through the reduction of the hydrogen-ion concentration which this carbonate treatment affects. It is not the advent of the hydrogen into the soil which renders increasing acidity inimical to plant growth but the exit therefrom of the many plant nutrient cations replaced by the hydrogen, and among these calcium is the most prominent. Soil acidity is, therefore, in reality a symptom and not the malady. The many advantages of colloidal clay over aqueous solutions as a growth medium in nutrient cultures are demonstrated. In the course of the paper the following points are made: calcium is the most important of the adsorbed nutrients even for such supposedly acid tolerant species as the soya bean. In trying to relate plant growth to the pH of the soil the facts indicate that it is related in reality to the approximate reciprocal of the hydrogen saturation and ionization, namely the calcium saturation. Some nutrient cations may go in reverse, i.e. from the plant to the soil. In these experiments much less of the same total of exchangeable calcium moved into the plant when present at a low degree of saturation on many clay molecules than when present at a higher degree of saturation on fewer clay molecules. Such results suggest that soil applications of calcium would be more efficient if placed in a limited soil area for more complete clay saturation rather than throughout the root zone for only partial saturation. Growth has taken place when nitrogen, phosphorus and potash are being lost from the plant to the soil but growth is never possible unless calcium is moved into the plant in early life. Calcium carbonate seems to inhibit manganese delivery to the crop by its neutralizing effect when it is evenly distributed throughout the soil but to stimulate the same when provided as a nutrient only in a limited zone of the soil. The significance of calcium in the ecological array in nature is briefly indicated. The possible chemical linkage of calcium to phosphorus is suggested. Plant services credited commonly to phosphorus may in some measure be found to be services by calcium.

22. ST. JOHN, J. L., AND MIDGLEY, M. C. 581.192
Relation of quantity of mineral elements in ash to ashing conditions in plant material.

J. Ass. offic. agric. Chem. Wash., 1941, 24: 932-5, bibl. 8.

The authors state that they cannot find any previously published work on methods for the determination of ash in feeds or plant material so as to produce a result that gives the closest possible correlation between the percentage of ash reported and the sum of the various mineral elements actually present in the sample. They discuss their own recent work on the subject.

23. BROADFOOT, W. M., AND BROWNING, G. M. 581.192: 546.33
Factors influencing determination of sodium in plant material.
J. Ass. offic. agric. Chem. Wash., 1941, 24: 916-26, bibl. 26, being *Sci. Pap. W. Va. agric. Exp. Stat.* 260.

Some factors affecting the determination of sodium in plant material are discussed and a modified procedure of the Barber and Kolthoff method is presented.

24. DENNIS, A. C., AND DENNIS, R. W. G. 546.27: 633/635
Boron and plant life. Part IV.* Developments in agriculture and horticulture 1939-40.
 Reprinted from *Fertil. Feed. St. J.*, 1940, Nov. 13 and 27, Dec. 11 and 24, and 1941, Jan. 8 and 22 and Feb. 5 and 19, pp. 24, bibl. (added in reprint), 227.

The authors note that boron research between the end of 1938 and the middle of 1940 has concentrated on two main aspects of the boron problem, viz. its function in the plant and the conditions under which it exists in the soil. Further, boron deficiency has been shown to create

* For Part III see *H.A.*, 9: 744.

disease symptoms in apricot and it has been shown to be necessary to a number of other plants including the carrot. Boron's conditions of existence in soils, its relationship with soil liming and its content in fertilizers and manures have been examined and are here discussed. The symptoms of its deficiency in many plants are noted. Boron treatment has been used sometimes with and sometimes without effect in a number of apple and pear, stone fruit and citrus disorders and a note is given of these trials. Trials have also concerned numerous vegetables, as well as narcissus, roses and other ornamentals, cereals and several tropical crops. A list is given of 81 plants belonging to 26 families, for the normal development of which boron has been shown necessary. Notes are also given of work on the following points:—Effect of boron manuring on disease susceptibility, distribution of boron in the plant, adaptability of plants to high boron concentrations, function of boron in the plant.

25. ATWATER, C. G. 632.19 : 546.27

The ancient history of boron deficiency symptoms.

J. Amer. Soc. Agron., 1941, **33** : 939-42, bibl. 18.

The early records of several plant diseases now known to be due to boron deficiency are traced. These diseases are shown to have been in existence long before the advent of synthetically produced nitrogen fertilizers and the use of purer and more concentrated grades of mixed fertilizers to which factors their incidence is sometimes attributed. The only "new" thing about these minor element deficiency troubles is their recognition as such.

26. MELVIN, E. H., AND O'CONNOR, R. T. 535.33 : 631.8 : 546.27 + 546.711 + 546.56

Spectrochemical analysis of trace elements in fertilizers. Boron, manganese and copper.

Industr. Engng Chem. (Analytical Edition), 1941, **13** : 520-4, bibl. 9.

Using a low-voltage direct current arc and a method involving a step sector and internal standard a procedure for the simultaneous determination of three of the more important secondary elements in mixed fertilizers, boron, manganese and copper has been found to give satisfactory results with an accuracy of $\pm 5\%$. [From authors' summary.]

27. O'CONNOR, R. T. 535.33 : 631.8 : 546.47

Spectrochemical analysis of trace elements in fertilizers. Zinc.

Industr. Engng Chem. (Analytical Edition), 1941, **13** : 597-600, bibl. 9.

A method is described for the spectrochemical determination of zinc in mixed fertilizers and it is applied to 44 fertilizers of known chemical composition. The method is capable of determining zinc within 2 parts per million to approximately 1% with an accuracy within $\pm 5\%$, thus equalling in accuracy methods previously described for the analysis of boron, manganese and copper.* [From author's summary.]

28. LEWIS, J. C., AND POWERS, W. L. 546.15 : 631.811.9

Iodine in relation to plant nutrition.

J. agric. Res., 1941, **63** : 623-37, bibl. 23.

No significant yield increase was obtained by adding small quantities of potassium iodide to nutrient solutions in which maize, barley or lettuce was growing. The maximal iodine content of the basal nutrient solutions was calculated to be of the order of 1 p.p.b. Tomatoes failed to give growth response to iodine additions to nutrient solutions where the iodine content was of the order of 0.001 p.p.b. Pot culture and field plot trials with a number of Oregon soils with early non-toxic iodine additions were largely negative.

29. WILLIAMS, W. O. 631.83

Rapid determination of potassium with dipierylamine.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, **39** : 47-50, bibl. 5.

A revision is presented here of Amdur's procedure† for the direct determination of potassium in plant and other material.

* See previous abstract.

† Photometric determination of potassium with dipierylamine. *Industr. Engng Chem. (Analytical Edition)*, 1940, **12** : 731-4.

30. PRINCE, A. L., AND OTHERS. 631.84
Forty-year studies of nitrogen fertilizers.
Soil Sci., 1941, 52: 247-61, bibl. 10.

A final report on cylinder studies concerning the availability of the nitrogen of a number of fertilizer materials at the New Jersey Agricultural Experiment Station.

31. BOND, G. 631.847
Symbiosis of leguminous plants and nodule bacteria. II. Further observations on the excretion of nitrogenous substances from nodules.
Ann. Bot., Lond., 1941, 5: 647-60, bibl. 8.

Experiments carried out in Wisconsin to detect excretion of nitrogenous substances from the nodules of legumes (mostly peas) growing in sand culture gave many negative results and some positive evidence of excretion, though the latter was slight compared to that observed in many of Virtanen's* experiments in Finland.

32. SPURWAY, C. H. 631.415.8
Soil reaction (pH) preferences of plants.
Spec. Bull. Mich. agric. Exp. Stat. 306, 1941, pp. 36, bibl. 81.

The pH preferences of some 1,700 plants are here tabulated. The common name is given first and this is followed by the botanical name. Where ascertained, notes are added of the minimum and maximum pH limit. Although there is an extensive list of references, no mention is made of the particular authority in each case.

33. HENDRICKSON, A. H., AND VEIHMAYER, F. J. 581.084.1: 631.432
Moisture distribution in soil in containers.
Plant Physiol., 1941, 16: 821-6, bibl. 6.

Experiments with sunflowers in different types of soil in containers show that, in order to get uniform distribution of moisture for plants growing in a container, it is necessary to add enough water to wet the entire soil mass to the moisture equivalent. Otherwise only the top layer is moistened to the moisture equivalent, while the soil at the bottom remains dry.

34. LAKIN, H. W., AND BYERS, H. G. 546.23: 631.4
Selenium occurrence in certain soils in the United States with a discussion of related topics. Sixth report.
Tech. Bull. U.S. Dep. Agric. 783, 1941, pp. 25, bibl. 28.

Reports 1-5 of the Division of Soil Chemistry and Physics on selenium occurrence in U.S.A. soils were given in *Technical Bulletins* 482, 530, 601, 702 and 758 of the U.S. Department of Agriculture.

35. ANON. 631.459
Wind erosion of soils.
J. Dep. Agric. S. Aust., 1941, 44: 353-5.

Work of the Experimental Branch of the Department of Agriculture, Bute, S. Australia, indicates that the drift sand ridges common in the district can be controlled by seeding with rye and lucerne accompanied by a dressing of superphosphate and by the planting of pyp grass (*Ehrharta villosa*) on the deep loose areas of sand inaccessible for drilling. The paper contains information on the performances of other types of grass under trial.

36. LEHMANN, E. W., AND HAY, R. C. 631.459
Save the soil with contour farming and terracing.
Circ. Ill. Coll. Agric. Ext. Serv. 513, 1941, pp. 44.

Directions are given for the planning of contour and terrace systems including the location and marking of the lines, the preparation of proper outlets and finally the construction and maintenance of the terraces. An appendix contains an account of the use and care of drainage levels and farm levels.

* Virtanen and von Hausen. *J. agric. Sci.*, 1935, 25: 278-89.

37. ROE, H. B., AND NEAL, J. H.

631.459

Soil erosion control.*Ext. Bull. Minn. agric. Ext. Div.* 201, 1939, pp. 36. ♦

Discussion of the causes of sheet erosion and gullyng. Contour and strip farming in conjunction with terracing are the remedy. Directions are given for the construction of terraces and their outlets and for maintaining them when made. Recommendations are made on gully prevention and elimination, with illustrations of different kinds of dam used.

38. PIZER, N. H., AND SHEA, M.

632.954

The removal of chlorate from soil and porous materials.

J. Soc. chem. Industr., 1941, 60 : 247-8, bibl. 5, also summarized *Fruit-grower*, 1941, 92 : 335-6.

Sodium chlorate may be removed from flower pots by dipping them in lime sulphate solution 1 in 40 and leaving them exposed to the air for a few days. Brickwork in glasshouses may be cleansed of chlorate by soaking with the same strength of lime-sulphur. Similarly chlorate in the soil in amounts sufficient to kill carnations, lettuce and tomatoes is removed by soaking the soil in a 1 in 40 lime-sulphur solution. The soil may be safely planted as soon as dry. The ground should be forked over and broken into small pieces and the lime-sulphur applied, preferably as a coarse-driving spray from a fruit tree sprayer, until the soil and top of the subsoil are thoroughly soaked.

39. DETURK, E. E., AND OLSON, L. C.

546.27 : 631.41

Determination of boron in some soils of Illinois and Georgia.*Soil Sci.*, 1941, 52 : 351-7, bibl. 15.

CLEGHORNE, J. W.

526.36

A home-made levelling device.*Fmg S. Afr.*, 1941, 16 : 279.

Construction and use of a simple ground levelling device.

(MATHEWS, I.)

631.67

The measuring of (irrigation) water.*Citrus Gr.*, 1941, No. 93, pp. 1, 3, 5.

GIRTON, R. E.

581.11

A sieve tube translocation model.*Plant Physiol.*, 1941, 16 : 831-3, bibl. 2.

EATON, F. M.

581.084.1 : 631.415

Use of nitric acid in control of pH and nitrate levels in nutrient solution.*Plant Physiol.*, 1941, 16 : 834-6.

The advantages are noted.

ROSENE, H. F.

581.144.2

Control of water transport in local root regions of attached and isolated roots by means of the osmotic pressure of the external solution.*Amer. J. Bot.*, 1941, 28 : 402-10, bibl. 16.

CALIFORNIA.

631.8

Commercial fertilizers—agricultural minerals.*Spec. Publ. Dep. Agric. Calif.* 183, 1941, pp. 109.

TREE FRUITS, DECIDUOUS.

General.

40. ANON.

634.1/7

Growers helped by research tests.*Orchard. N.Z.*, 1941, 14 : 10 : 9-11.

In a brief note on the work of the Plant Research Bureau of the D.S.I.R. at Auckland, N.Z., on fruit varieties and stocks it is mentioned that the red Cox's Orange sports are mostly inferior to the normal type in flavour. There is, however, one type that combines the old Cox flavour

with a very rich colour. Three plum stocks, Black Damas C, Brompton and Common Mussel have severely dwarfed the peach, Lee's Seedling. In the cherry stock trial with several East Malling mazzard selections and the scion variety, Black St. Margaret, some of the mazzard stocks are clearly more vigorous than others.

41. WOODIN, M. D. 634.11 : 338

Prices of apple varieties as a factor in variety selections.

Bull. Cornell agric. Exp. Stat. 761, 1941, pp. 19.

Notes and graphs demonstrate the changing popularity shown by the market prices in the States over a large number of years of 39 American apple varieties.

42. BUCHANAN, M. T. 634.11 : 658.8

Washington apples on the New York and Chicago fruit auctions.

Bull. Wash. agric. Exp. Stat. 401, 1941, pp. 55.

The volume of Delicious apple sales on the Chicago and New York markets increased during the 12 seasons 1928-9 to 1939-40. Sales of all other varieties decreased. Among the more popular other varieties were Winesap, Rome Beauty, Jonathan, Spitzenburg and Yellow Newtown. Winesap more or less maintained its position and Yellow Newtown slightly increased in relative importance.

43. JOHNSTON, S., HUTSON, R., AND CATION, D. 634.25

Peach culture in Michigan.

Circ. Bull. Mich. agric. Exp. Stat. 177, 1941, pp. 85, bibl. 10.

The first part (pp. 1-51) amounts to a manual on peach cultivation in Michigan. The second (pp. 52-68) by Hutson concerns peach pests and their control. The third (pp. 69-84) deals with parasitic and non-parasitic disorders and their removal.

44. VAILE, J. E. 634.25

Peach varieties in Arkansas.

Bull. Ark. agric. Exp. Stat. 414, 1941, pp. 28, bibl. 19.

Ninety per cent of commercial peach plantings in Arkansas are of Elberta. The advantages and disadvantages of very many other varieties for planting are discussed.

45. CONDIT, I. J. 634.37

The Brunswick (Magnolia) fig.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 143-6, bibl. 16.

Reasons why the Brunswick and Magnolia should be considered as one and the same fig.

*Propagation.**

46. PROVAN, J. L., AND GREATOREX, F. J. 634.1/2-1.541

Budding, grafting and reworking of fruit trees.

J. Dep. Agric. Victoria, 1941, 39 : 319-25, 387-94, 431-40, 481-8, 539-44, bibl. 6, reprinted in *Fruit World*, Melbourne, 1941, 42 : 8 : 7-8, 22-3 ; 42 : 9 : 7, and subsequent numbers.

The principles of budding and grafting and the methods by which the practices may be used for re-working fruit trees, including citrus, are fully explained and illustrated. A very useful table of stock/scion affinities is given.

47. KAWAKAMI, S., AND ISIMARU, T. 634.21 + 634.22

On mume and apricot growing in districts of low temperature. Grafting and growth hormones. Time of budding, watering and windbreaks. [Japanese.]

J. hort. Ass. Japan, 1941, 12 : 55-62.

Trials show the best time of budding mume varies with the variety and stock in question. Those showing strong apricot characteristics can be budded earlier than the rest. Observations are made on the behaviour of two seedling rootstocks both as regards growth and the unions made by them with a Togoro mume scion.

* See also 1, 2, 3.

Rootstocks.

48. BRYDEN, J. D. 634.11-1.541.11

Siberian crab apples as rootstock.*Agric. Gaz. N.S.W.*, 1942, 52: 480.

Trees of Delicious, Jonathan, Granny Smith and Democrat on Siberian crab (*Pyrus malus baccata*) planted in the Bathurst Orchard stock trials in 1932 have grown more strongly than the same varieties on Northern Spy in the same trial. Trees on this stock show extreme drought resistance, especially Jonathan. The stock has a vigorous and extensive root system.

49. LINCOLN, F. B. 634.11-1.541.11 : 581.144.2

Scion influence on nursery apple tree roots.*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 237-9.*

These observations recorded from Maryland were made on the roots developed under 102 different clonal apples budded on 3-year-old seedlings. The buds represented 5 groups of material all of which was intended for stocks. There were 5 groups containing comestible varieties, hybrids with Spy blood, hybrids with wild American crab apple blood, hybrids with Asiatic crab apple blood and native wildlings. The comestible varieties were Stayman, York, Golden Delicious, Hiberna, Ferman's Paragon, Gilbert's Black Twig, Limbertwig, Spy, Cortland, Yates, Buff, Anoka, Summer King, Summer Queen, July and Chenango. The data show that the 3-year-old domestic seedlings may be made to change their root characteristics by grafting other tops on them, but that the ability of these alien tops to induce changes in the roots of nursery trees is not general, since in this study out of 102 clones used only 30 produced roots uniform enough and of sufficient distinction to attract attention.

50. LINCOLN, F. B. 634.11-1.541.11 : 581.144.2

Evidence of scion influence on stock.*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 240-4.*

From his observations in Maryland on the results of budding French crab seedlings with some 13 different apple clones the author considers that certain selected scions may be associated with particular forms of attached seedling roots. He believes that budlings influence roots as frequently as grafts. Further, he believes it probable that of any random selection of varieties not more than 20% will consistently induce a specific characteristic root disposition in young seedling roots.

51. TUKEY, H. B., AND BRASE, K. D. 634.11-1.541.11

Similarity in the nursery of several Malling apple stock and scion combinations which differ widely in the orchard.*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 245-6, bibl. 2.*

Observations are recorded from Geneva of the comparative growth in the nursery of McIntosh, Cortland, Delicious and Northern Spy on the following range—with one or two individual exceptions—of Malling apple stocks:—I, II, III, IV, V, VII, IX, XII, XIII, XVI. It is clear from the figures given that under Geneva conditions (good commercial nursery soil) the effect of the stock on the scion, as regards height and diameter of budling, is very slight in the nursery and much smaller in the nursery than in subsequent years in the orchard.

52. TUKEY, H. B., AND BRASE, K. D. 634.11-1.541.11

The performance of Malling apple rootstocks in the nursery as regards stand of lining-out stock and production of nursery trees.*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 247-52; bibl. 6.*

Observations at Geneva on good commercial nursery soil of the behaviour of some of the unworked Malling rootstocks as lining-out stock, the stand and size of tree produced by them in the nursery and of their behaviour when compared to that of seedling stocks, show that the growth and performance of both the unworked stocks and of the nursery trees were equal to or better than those of good blocks of commercial seedling stocks in the immediate vicinity. Differences between Malling clones. In a season of deficient spring rainfall, e.g. 1939, differences between stocks became more noticeable. The clones which gave the best stand as lining-out stocks were those which rooted most easily in the stool beds, namely, I, IV, VII, IX, XIII and XVI,

while II and XII gave the worst stand. *Comparison with French Crab seedlings.* The stands of Malling stocks consistently equalled or surpassed those of French Crab seedlings. This superiority might be of economic value in springs deficient in rainfall. Probably the improved stand of the Malling stocks is due to their general ability to regenerate roots more quickly. *Relation of size of rootstock and degree of rooting.* Although all 4 size grades of lining-out stock gave commercially satisfactory stands, there were some minor differences, which are noted here. A direct relationship was established between degree of rooting and the resultant stand of lining-out stock. The greatest percentage stands were obtained consistently with the best rooted grades and the poorest stands with the poorest grades. *Adaptability of Malling clones.* No incompatibility was discovered.

53. BRYNER, W. 634.11-1.541.11
 Unterlagen-Typ IX. (The behaviour of type IX apple rootstock in Switzerland.)

Schweiz. Z. Obst- u. Weinb., 1941, 50 : 476-7.

Jaune de Metz, when ungrafted, grows in Switzerland into a fairly broad, slightly drooping bush with few branches, not quite 1 m. in height. It begins growth early in the year and its blossoming and shoot growth are also early. It comes into regular fruiting at a very early age. The fruit ripens at the end of August, resembling in form and colour a small Landberg Reinette, but it is sweet and of inferior quality. The roots are shallow and consist of one or two or, at the utmost, three little-branched, brittle main roots. Bud union is good with all varieties and good growth results. Trees worked on IX only achieve full development in warm sheltered positions in rich, warm and deep soils. Under these conditions they produce fruit quickly, plentifully and regularly, the fruit being noticeable for its very deep colour and early ripening. Growth, which is initially strong, falls off with the onset of fruiting and only strong growing varieties such as Belle de Boskoop, Gravensteiner, etc., can be considered for bushes. The "spindle" bush has proved the most suitable form [see *H.A.*, 8 : 703]. Heavy croppers or weak growers should either be worked on more vigorous stocks or trained as espaliers, cordons, etc. In the two last cold winters trees on IX have suffered severely from frost, dying back even as far as the union, and it seems that such damage cannot be avoided on wet, cold soils when pruning is done during the hard winter cold. In good garden soil and with pruning delayed till nearly spring the danger should be much less.

Root growth.

54. BOWMAN, F. T. 634.11 : 581.144.2
 Root types among apple seedlings.
Agric. Gaz. N.S.W., 1941, 52 : 426-8, 475-7.

The results are discussed of the examination over 10 years of root types of 21,000 seedling apples resulting from controlled hand pollinations among 30 apple varieties. The seedlings could be classified into 3 types. (1) The crown-rooted type, (a) crown fibrous with few anchorage roots, (b) less fibre and stronger crown roots. Variation between (a) and (b) is continuous. (2) The intermediate type with primary, somewhat limited tap-root but developing crown roots and crown fibre. (3) The tap-rooted type, without crown roots or fibre. The root types were permanent and appeared at an early age and were not altered later by the scion varieties. The number of each root type appearing in any batch of seedlings depends on the parentage. A number of parental groups have been formed based on the degree of ability when interpollinated to cause crown rooting in their seedlings. The varieties in each group are named. The characteristics of crown-rooting, the variation in taproot systems and the reasons for the different root types are discussed. It is made clear that for a number of reasons the crown-rooted type is undesirable as a stock. Methods of obtaining tap-rooted types are selection during transplanting from miscellaneous or open-pollinated types or the use of seed from fruit which has been suitably pollinated, e.g. with a variety of group 4, in which tap-rooting is almost completely dominant, as one of the parents. So far this group is comprised of Tasma, Jonathan, King David, Crofton, Buncombe, Mountain Pippin, Ohio Nonpareil, Red June, Salome, Tasma's Pride, Wabash, Red Winter, William's Favourite, Coon Red, Western Beauty. If unselected stock has to be budded, some last minute selection can be made by budding only those with

clean smooth boles. Stocks with crown roots will have more or less nodulated stems. The article is well illustrated.

Pollination.

55. TATARINTSEV, A. S. 634.11 : 581.162.3
Further notes on changing the morphology of fruits by external pollination.
Vernalisation, 1940, No. 5 (32), pp. 130-1.

Writing from the Michurin Horticultural Institute, the author describes an instance of the influence of pollen from one variety on the fruit of another. In a small garden near Moscow in 1926 he noticed that an apple tree of indeterminate variety had fruit of different shapes. Some were oval, free from rust and had a swelling at the stalk, while others were more or less squat and affected with rust, resembling the fruit of a neighbouring tree. Between these two extreme groups, gradually approximating to one or the other, were fruit of intermediate shapes. The fruits of both trees were streaked with red.

56. ELLENWOOD, C. W. 634.11-1.55 + 581.145.2
Bloom period and yield of apples.
Bull. Ohio agric. Exp. Stat. 618, 1941, pp. 21, bibl. 7.

A 30-year record of the average annual yield per tree and date of bloom is presented for 146 varieties of apple growing in the station orchards at Wooster, Ohio. Notes are given on the incidence of frost damage. The average length of the blooming period noted between 1930 and 1939 was 8 days. The blooming periods with a few exceptions overlap sufficiently for pollination purposes. The average annual yield per tree of 61 varieties was for 1910-39, 13.8 bushels; for 1910-29, 12.7 bushels; and for 1910-19, 12.7 bushels.

57. TANQUARY, M. C. 638.1
Beekeeping in Minnesota.
Ext. Bull. Minn. agric. Ext. Div. 204, 1939, pp. 32.

Growth and nutrition.

58. REYNEKE, J., AND DU TOIT, M. S. 634.22-2.19
Shoot growth and fruit relationships of the Kelsey plum.
Sci. Bull. Dep. Agric., S. Afr. 219 (*Stellenbosch Series* 41), 1940, pp. 53, bibl. 13, 6d.

Observations were made on Kelsey trees of comparable age growing in 4 localities and the incidence of certain physiological disorders, notably heat spot, an orchard trouble, and internal browning, a storage disorder, are considered in conjunction with the growth of the tree. Although intense heat and low temperature are the primary causes of these disorders, the susceptibility of the fruit will largely depend on the inherent resistance of its tissues. This in turn depends on the manner of its development in the orchard. It was found that quick ripening fruits or those from crops with short harvesting periods are more susceptible than slower ripening fruits or those from crops with long harvesting periods. The rate of ripening is largely determined by the rate at which solids, chiefly non-reducing sugars, enter the fruit at a critical period. The rate of inflow of material into the fruit is determined by the manner and rate of growth of the tree, which are discussed at some length in the text.

Tree growth or shoot growth rate during any period of development may be influenced by environmental conditions impinging on it. These are:—*Air temperature.* Shading of trees with muslin, while not decreasing air temperature appreciably, reduced heat spot significantly. Fruits grown at higher and more favourable altitudes are, whatever the average maximum daily temperatures, less susceptible to such disorders. *Soil type.* Shallow or very light textured soil gave rise to precocious fruit very susceptible to heat spot and storage disorders. *Soil nutrients.* A deficiency affecting the growth rate of the tree is reflected in the rate at which the fruit ripens, the length of the harvesting period and hence the susceptibility of the fruit to physiological disorders. *Size of crop.* Increased precociousness and susceptibility to heat spot was followed by a decrease in the number of fruits per tree.

The mechanism involved in the above reactions is summarized. There would appear to be a close analogy between Kelsey spot in plums and bitter pit in apples and it is suggested that a similar relationship exists between susceptibility of the apple to bitter pit and rate of earlier shoot growth, rate of fruit ripening, unequal development of tissues and nutrition as between Kelsey spot and these factors.

59. DE VILLIERS, G. D. B. 631.543.1 : 634.1/8
Climate and its relation to deciduous fruit production.
Sci. Bull. Dep. Agric. S. Afr. 222 (Stellenbosch Series 43), 1940, pp. 35, bibl. 9, 6d.

Peach production in the Union since 1926 has fluctuated greatly as the result of delayed foliation. Peach bud vitality appears to be impaired by high temperatures in June and July, i.e. the dormant period. This seriously affects cropping. The conclusion is confirmed that unseasonable high radiation temperatures which are accompanied by low humidity, bright sunshine and high evaporation, are primary causes of delayed foliation, drying S.E. winds and low available soil moisture being contributory factors. June and to a slightly less extent July appear to be critical months for fruit production. Attention is drawn to abnormal fluctuations of temperature in August and September and their bearing on bud development, namely a possible modification of the effects of June and July weather. The temperatures and rainfall of the chief fruit districts of the western Cape Province are compared. It is noted that the higher the mean minimum temperatures in June and July for a district the greater is the incidence of delayed foliation, e.g. it is much greater at Stellenbosch (43.7° F.) than at Ceres (35.2° F.). In many districts the absence of low temperature during winter seems to contribute to delayed foliation. The chilling requirements of almonds, plums, apricots, peaches, pears and apples are discussed, apples having the highest and almonds the lowest requirements of these fruits. Data from California show that similar climatic trouble is experienced in latitudes 38°-40° N., as in latitudes 33°-34° S. in S. Africa.

60. BROOKS, R. M., AND PHILP, G. L. 631.543.1 : 634.1/8
Climate in relation to deciduous fruit production in California. I. Effect of the warm winter of 1940-41 on peach and nectarine varieties in Northern California.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 190-4, bibl. 3.

Two hundred and eighty peach and 58 nectarine varieties were observed in the spring of 1941 for their susceptibility to dropping their flower buds after the warm winter of 1940-41. These varieties were placed in four classes depending upon the amount of bud drop observed. The results are given in tabular form. [Authors' summary.]

61. LAMMERTS, W. E. 634.25 + 634.26
An evaluation of peach and nectarine varieties in terms of winter chilling requirements and breeding possibilities.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 205-11, bibl. 4.

Fifty varieties of peach and nectarine were evaluated in trials at Ontario, California, in terms of their winter chilling requirements. The behaviour of different varieties as regards low chilling requirements is considered and it is suggested that further breeding and selection along approved lines may result in high quality early ripening varieties of low chilling requirements.

62. MACARTHUR, M., AND WETMORE, R. H. 634.11 : 581.145.2
Developmental studies of the apple fruit in the varieties McIntosh Red and Wagener. II. An analysis of development.
Canad. J. Res., 1941, 19, Sec. C, pp. 371-82, bibl. 8.

Further work is reported from Kentville, N.S., on the development of the apple fruit [for previous article see *J. Pomol.*, 1939, 17 : 218-3 ; *H.A.*, 9 : 1169]. The authors' abstract sums up the results of their observations as follows :—Growth in the various tissues of the fruit of a McIntosh Red and a Wagener tree, both self-pollinated, is compared. For several days succeeding pollination no increase in fruit size is apparent. Fertilization is followed by general cell division and cell enlargement. The period of cell division varies with the tissue and with the variety.

Final cell size is reached first by the cells of those tissues near the centre of the apple. Impressed upon the fundamental pattern of growth is the localized activity of the primary vascular bundles the cambia of which add cells to the ground tissue. Angulation in the Wagener is accentuated by this activity. With the exception of cells of the epidermis, final cell size is approximately equal in comparable regions of the two varieties. Differences in regional extent are due to differences in numbers of cells in that region.

63. ANTHONY, R. D. 634.11 : 581.144
Further studies of the value of trunk measurements in interpreting apple tree growth.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 19-22, bibl. 6.

High correlations were established between trunk girth growth and tree growth generally in 6 apple varieties grown at State College, Pennsylvania, and in West Virginia under different conditions of rootstock and environment—in one case the trees were in cylinders. This seems to indicate the advisability of using trunk measurements as one of the chief indexes to tree growth during the early years of an apple orchard.

64. HEWETSON, F. N. 634.11 : 581.14
The correlation of trunk circumference with weight of top in some double-worked apple trees.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 233-6.

Data from East Lansing confirm previous work that there is a close correlation in apple trees between trunk circumference and weight of top and that the latter can be estimated with reasonable accuracy by computation from trunk circumference measurements.

65. OVERHOLSER, E. L., OVERLEY, F. L., AND WILCOX, J. C. 634.11 : 581.144 : 631.55
Some correlations between growth and yield of the apple in Central Washington.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 11-5, bibl. 10.

Data obtained in 1935-1938 from 69 Jonathan, 45 Rome and 27 Winesap apple trees allow the following conclusions to be reached. 1. There was a strong tendency for a comparatively heavy crop to be followed by a comparatively light one and vice-versa. 2. The terminals tended to be longer in the "on" than in the "off" year. 3. The increase in trunk girth tended to be smaller in the "on" than in the "off" year. 4. There was no evidence of any relationship between terminal length and increase in trunk circumference.

66. HENDRICKSON, A. H., AND VEIHMEYER, F. J. 634.13-1.432
Some factors affecting the rate of growth of pears.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 1-7, bibl. 7.

The authors worked with 23-year-old Bartlett pears on Japanese pear rootstocks growing in a loam soil with a moisture equivalent of approximately 22% and a permanent wilting percentage of about 12.5. They measured the fruits normally at weekly intervals and took samples every fortnight. They found that the fruit rate of growth was reduced by the exhaustion of readily available moisture in the top 4 feet of soil. Until this moisture was exhausted irrigation had no effect on the rate of growth. High temperatures and severe evaporating conditions seemed to reduce the growth rate temporarily. Artificial wetting of the leaves by spraying or sprinkling temporarily increased growth rate, but this fell to about the previous level on the following day. Wetting the leaves actually led to a temporary increase in growth rate even in the unirrigated plot where the trees had been without readily available moisture in the top 4 feet of soil for over a month.

67. MEADER, E. M., AND BLAKE, M. A. 634.25 : 581.144.1
A foliarmetric gauge.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 195-200, bibl. 4.

Directions are given for the construction and use of a simple gauge for the quick determination of peach leaf measurements. The same principles can be adopted for measuring the foliage of other plants.

Cultural practice.

68. PAGE, F. 634.25-1.542.3
 Le pêcher en éventail. (**Fan-training a peach.**)
Rev. hort. suisse, 1940, 13: 56-9.

An illustrated description of a method of fan-training a peach. The first five years are dealt with individually. Full formation will not be obtained till at least the eighth year.

69. POTTER, J. M. S. 634.1/7-1.542
The pruning of hardy fruit trees.
J. roy. hort. Soc. 1941, 66: 392-8.

A concise account of the principles underlying the pruning of different kinds of hardy fruit trees, excluding peaches and nectarines. The fruits are classified into 4 groups according to their bearing habit and, therefore, according to the treatment required and each kind receives separate mention within the group. Named varieties requiring special treatment (except apples) are not dealt with. The paper provides a very useful guide and if the instructions are followed much amateur and possibly some professionally grown fruit should be saved to the country.

70. HOWLETT, F. S. 634.11-1.542.24
Ringing in relation to fruit set in the apple.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 212-6, bibl. 7.

Data of experiments on ringing apple trees at Wooster, Ohio, in 1928-1931 and in 1938-1940 do not justify the practice of ringing to increase the set of light-setting apple varieties. Only in some cases was the observed increase in set significant. Whereas one pair of branches might show a favourable response, others on the same tree and similarly located might show no response at all. Results varied greatly from branch to branch, tree to tree, season to season, variety to variety. Certain of the varieties tested are triploid and possess considerable egg cell sterility. Hence cross-pollination together with maintenance of vigour seems preferable as a means of maintaining maximum fruit set in these varieties.

71. WATERS, E. F. 634.1/7-1.542.27
Thinning of fruit trees will ensure better all-round crop.
Orchard. N.Z., 1941, 14: 11: 1-2.

A discussion on thinning, the objects of which are summarized as follows. (1) To increase size, quality and uniformity of fruit; (2) to reduce disease and insect injury to fruit and trees by making them more accessible to spray; (3) to prevent breakages of limbs and branches. A few general rules are given. Thin 3-4 weeks after petal fall or when the fruit (e.g. apples) is approximately 1 inch in diameter, removing very small, diseased or misshapen fruits always. Thin stone fruit so that no two fruits will touch when mature. With apples and pears divide the tree into three zones. In the upper zone reduce all bud clusters to singles, in the middle zone to twos and in the lower zone to threes. In the top zone in addition all fruit should be removed from the top of the main limbs for a distance of 15 inches to induce good leader growth. On pronounced alternate bearing varieties it is suggested that to leave fruit only on each alternate spur would encourage annual bearing. The fruit remaining must not be unduly disturbed in the operation or it may drop later on.

72. MOON, H. H., AND OTHERS. 634.25-1.542.27
The effect of load of fruit on the tree upon composition, flavor and dessert and canning quality of twelve varieties of peaches.
Fruit Prod. J., 1941, 21: 46-50, 54, 61, bibl. 22.

Experiments at Arlington, Va, of the effects of fruit thinning on vigorous, 7-year-old peach trees are recorded. The amount of effect of thinning varied with variety but its character was the same in all. Fruit from thinned trees was consistently higher at all stages of maturity in total solids, soluble solids, total sugars, reducing and non-reducing sugars (sucrose) and titratable acidity than that from unthinned trees, all differences found being statistically significant. Differences in astringency and insoluble solids were non-significant. The percentage of insoluble solids on the dry weight basis was smaller in the thinned fruit. Thinned fruits were more attractive looking and weighed more. Gross yield was reduced, but the amount of marketable

fruit was greater from the thinned trees. The fruit from the thinned trees was superior in sweetness, balance between sugar, acidity and astringency and in fullness and flavour of fresh fruit. There were no detectable differences in texture of flesh.

73. GUTHRIE, J. D. 634.25 : 577.15.04
Sprays that break the rest period of peach buds.

Contr. Boyce Thompson Inst., 1941, 12 : 45-7, bibl. 2.

p-Thiocresol, 4-chloro-o-phenylphenol and α -nitronaphthalene, break the rest period of peach buds when applied in sprays. [Author's summary.]

74. MAGNESS, J. R., AND BATJER, L. P. 634.11-1.55 : 632.95

Modifying the biennial bearing habit in apples by spraying to prevent fruit set.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 228-32, bibl. 1, and *Amer. Fruit Grower*, 1941, 61 : 10 : 10, 20.

Experiments in West Virginia in 1939 and 1940 showed that a single thorough spraying with tar distillate at 0.8% or of dinitro-orthocyclohexylphenol at one-half dormant strength sufficed to prevent the set of a large proportion of fruit in Stayman, Winesap, Gano and York Imperial apple trees. The treatment offers the grower a chance, by applying it in the on-year, so to reduce his crop in that year as to make more likely a good crop in the following and ordinarily off-year. Coverage must be very thorough, particularly of large trees. Moreover the spraying must be done when spur buds are in the late cluster to early pink stages. Early spraying proves ineffective and later spraying would result in foliage injury and tend to decrease fruit bud formation.

75. READ, F. M. 634.11-1.55 : 632.95

Blossom killing sprays for apple crop restriction.

J. Dep. Agric. Vict., 1941, 39 : 428-30.

The paper is claimed to be a fair statement of one substantial practical experience in blossom thinning by spraying. In 1940 cresyllic acid, tar distillate and sodium nitrate were used in preliminary trials, the former being finally selected and used as a 1% solution, the commercial orchard (near Melbourne) of 1,000 well-grown 15-year-old trees requiring 3,000 gallons of spray. The aim was to suppress the crop entirely. The optimum time to spray is when the cluster bud is in the early green and late pink stages. Full or even half-bloom is too late to prevent set, probably because the vulnerable pedicel is then protected by the petals. In Granny Smith and Ballarat 5% of a normal crop had to be removed by hand, in Yates and Jonathan 10%. Statesman for some reason not yet determined was not affected though all the apples were blemished. Only slight leaf injury occurred, Jonathan suffering the most. The trees were not pruned. In 1941 after pruning the trees were in normal health and showed plenty of blossom.

76. STRICKLAND, A. G., KEMP, H. K., AND BEARE, J. A. 634.1/2-1.55 : 577.15.04

Spraying with plant growth substitutes.

Fruit World, Melbourne, 1941, 42 : 10 : 7-9, bibl. 2, reprinted from *J. Dep.*

Agric. S. Aust. (undated but between May and Sept. 1941).

Trials were carried out in South Australia in 1940-41 with growth substance sprays for the purpose of reducing near-maturity fruit drop. Williams' Bon Chrétien sprayed for the second time on 4 February had by 17 February dropped only 9% of their crop as opposed to 41% of the unsprayed pears. The early spraying on 20 January was not very effective. Similarly treated Red Gravenstein apples had lost only 16% as compared with 40% for the unsprayed trees 3 weeks after treatment. When final records were taken well beyond normal harvesting time the sprayed trees, both pears and apples, still carried 20-30% of the original crop, the unsprayed trees being practically bare. Maturation and senescence of the attached fruits had proceeded and the bulk of the fruit, though still firmly attached, had rotted. A two-thirds reduction in drop was also obtained with Jonathan apples. If the spraying is accurately timed to a fortnight before picking date one application should be sufficient. In these experiments an α -naphthalene acetic acid concentration, 20 parts per million, was used but results elsewhere indicate that 5-10 parts per million would be equally effective. Sufficient citric acid was added

to the solution to show acidity when tested with litmus paper, alkaline solution being reputed to be less effective.

77. (GARDNER, F. E.) 577.15.04 : 634.1/2-1.55

Future possibilities of hormone sprays.

Amer. Fruit Grower, 1941, 61 : 6 : 9-12.

The article is based in part on observations made by Dr. F. E. Gardner, United States Department of Agriculture. In apples, peaches, pears, plums, apricots and citrus the preharvest drop of fruit has been controlled by the use of hormone sprays. Blossom delay has been obtained in apples, peaches, pears and citrus. Attempts to improve fruit set in various fruits have failed. Acidity in early oranges can be reduced by hormone sprays but at maturity both sprayed and unsprayed fruits reach the same degree of acidity. Hormone sprays on cherries are reported by a grower to have reduced browning and shrivelling from 50% to 1% and to have increased the sugar content through the cherries hanging longer on the trees. Labour was saved because all the cherries on a treated tree ripened simultaneously and could be gathered at one picking. Other uses for hormone applications discussed are the formation of wide angle crotches on young apple trees and increased root formation on transplanted pecans.

78. ASAMI, Y. 577.15.04 : 581.163 : 634.1/7

Effectiveness of growth substances on preventing fruit drop. (Preliminary report.) [Japanese.]

J. hort. Ass. Japan, 1941, 12 : 1-10, bibl. 20.

Parthenocarpny was most effectively induced in 84% of the tests with the Fuhu kaki by spraying the stigmata with 0.05% naphthalene acetic acid as against 3% when using 0.005% naphthalene acetate. Results from the use of methyl indole acetic acid at 0.05 and 0.005% concentrations were intermediate. Spraying the Yokono variety with the same concentrations of the same substances to prevent early fruit drop had but little effect. Spraying the same variety with 0.005% naphthalene acetic acid reduced late fruit drop by half. Fruit drop was prevented in a Chinese pear (Ji-nashi) by spraying on 28 August with 0.01% and 0.005% solution of naphthalene acetic acid, but spraying 3 weeks later had no effect.

79. HOFFMAN, M. B. 634.11-1.55 : 577.15.04

Controlling the pre-harvest drop of apples.

Bull. Cornell agric. Exp. Stat. 766, 1941, pp. 18, bibl. 12.

Premature fruit fall may be a serious problem in McIntosh. Factors which predispose to premature drop are excessive nitrogen manuring, heavy mulching and late cultivation. The phenomenon always appears worse under conditions of a low carbohydrate supply. An efficient leaf surface is essential to meet normal carbohydrate requirements. This is best obtained by a well-distributed pruning and the use of mild fungicides. There is some evidence that wet seasons and high temperatures during harvest are the chief weather conditions which increase drop. A single application of naphthalene acetic acid or its sodium salts at various strengths (0.0005-0.001%) at the correct time, i.e. just when the drop started, was found to keep McIntosh apples on the tree a further 7 to 10 days. A second application is unprofitable.

80. KEMP, H. K. 634.21-1.8

Apricot manurial trial at Light Pass.

Fruit World, Melbourne, 1941, 42 : 9 : 15-6, 42 : 10 : 17-8.

A field experiment on the manuring of 15-year-old Moorpark apricots has been carried out in the Light Pass district for the past 5 years. The soil is a sandy loam over friable dark brown clay at 15 inches. The average annual rainfall is 20 inches. Trees receiving sulphate of ammonia only, 3 lb. per tree, gave an average yearly increase of 17 cwt. of fruit per acre over the unmanured controls. Trees receiving mixed fertilizer, 2 : 2 : 1, showed an increase of 1 ton 3 cwt. over the controls for the same period, the advance being due probably to the superphosphate. The pruning weights of the trees receiving sulphate of ammonia increased considerably. Definite response of fruit trees to potash manuring has not yet been recorded from Australia and in view of the present cost the element should be omitted. The limited rainfall renders cover cropping risky but a reasonable weed growth should be encouraged and some of the annual fertilizer

allotment should be broadcast over the orchard for the purpose, 2 cwt. of 45% superphosphate and $\frac{1}{2}$ cwt. sulphate of ammonia per acre being recommended. Local seasonal influences are discussed.

81. SUDDS, R. H., AND BROWNING, G. M. 634.1/7-1.8-1.4
The effect of soil-management methods on certain physical and chemical properties in relation to the infiltration rates in West Virginia orchards.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 38-46, bibl. 11.

Results of cultivation and surface mulches on orchard soils in the Eastern Panhandle are discussed. Compared with an undisturbed sod cover, cultivation has reduced materially the organic-matter content, the percentage of the larger-sized aggregates, the non-capillary porosity, and the infiltration rates; it has increased the volume weight and the dispersion ratio. Straw mulch, by protecting the surface from the dispersing action of the water from the infiltrometer nozzles as it fell on the soil, materially increased the infiltration rate over that of the cultivated areas. Comparable protection would be afforded against beating rains. The data emphasize the importance of protecting the soil surface with adequate vegetation or with ample organic mulches as they are related to the conservation of water and soil, both of which are highly essential to successful orcharding in the Cumberland-Shenandoah Region. In the absence of mechanical compaction, orchards which have been in sod continuously thereby have automatically maintained favourable structure conditions which are conducive to the rapid infiltration of water with little, if any, loss of soil. In marked contrast, cultivation tends to deplete the fertility of the soil and is likely to be destructive of its desirable physical properties, thus increasing the susceptibility of the orchard site to losses of water and of soil and the liability of the trees to injury by drought. [From authors' summary.]

82. BAKER, C. E. 581.192 : 634.11 + 634.25
The effect of different methods of soil management upon the potassium content of apple and peach leaves.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 33-7, bibl. 7.

Data from Lafayette, Ind., are given of the potassium content of apple and peach leaves in 1939 and 1940 following different treatments. They show that as regards apple trees the increased K content of leaves from trees to which straw was applied was noticeable in comparison with the area in sod without mulch. Moreover, generally speaking, trees in cultivation to which KCl was applied did not show so much K in their terminal leaves as those mulched with straw. The same was seen in the peach experiments.

83. PENZHORN, K. E. W. 631.875
Compost.
Fmg S. Afr., 1941, 16 : 299-300.

The uses and preparation of compost are discussed. The following method has been found both successful and economic in irrigated areas in S. Africa. Wheat straw is soaked for 2-3 days in a hole filled with water and subsequently worked into heaps 6 ft. wide. On each one-foot layer of straw is placed a 3-inch layer of kraal manure, or instead a 2 : 2 : 1 mixture of ammonium sulphate, agricultural lime and superphosphate respectively, at the approximate rate of 120 lbs. per ton of dry material, is worked into the wet material with a pitchfork. The finished heap is 6 feet high. The heap is not again watered or turned and is ready for use in about two months.

84. HAAS, A. R. C., AND COMPTON, O. C. 634.1/2-1.415
The pH of irrigated orchard soils.
Soil Sci., 1941, 52 : 309-33, bibl. 11.

The pH values of several hundred orchard soils in southern California including a wide range of soil types and locations have been determined. With few exceptions, the pH values found in soil *in situ* at various depths in orchards indicated an acid condition. Infertilizer trials in certain lemon orchards the ammonium phosphate-treated soil was more acid than either the manure- or the calcium nitrate-treated soils and produced the best results. The exclusive use of manure in certain orchards was accompanied by relatively high pH values in the soil and by symptoms of minor-element deficiency in the leaves, whereas the use of ammonium sulphate as a supplement

was accompanied by a reduction in the pH and by no deficiency symptoms. The application of virgin soil to an old orchard resulted in marked beneficial effects, now obtainable through the medium of certain sprays. Many old outstanding orchards were growing in acid soils when the pH values were determined at the field moisture content. When growth was healthy, somewhere in the medium an acid condition could be found. Many orchards were successful when the pH values of the soil at the 1-5 soil-water ratio were 8.0 or higher, provided the soil moisture was kept under control and limitations were made thereby on the extent of hydrolysis. [From authors' summary.]

85. MEADER, E. M., AND BLAKE, M. A. 634.25
Further studies on identification of peach varieties by leaf characteristics.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 177-82, bibl. 4.
 See also *Ibidem*, 37 : 203-7.
- COWART, F. F., AND SAVAGE, E. F. 634.25
Important factors affecting peach tree longevity in Georgia.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 173-6.
 Mainly climatic.
- BLAKE, M. A., AND DAVIDSON, O. W. 634.25 : 581.192
Some results of acidity and catechol tannin studies of peach fruits.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 201-4, bibl. 2.
- SAVAGE, C. G. 631.8 : 634.1/8
Value of organic matter and nitrogen in preventing the loss of fertility in orchard soils.
Fruit World, Melbourne, 1941, 42 : 8 : 20-2.

SMALL FRUITS, VINES AND NUTS.

86. SHERRARD, G. O. 634.723
Observations on black currant varieties grown at Albert Agricultural College, Glasnevin.
J. Dep. Agric. Eiré, 1941, 38 : 344-54, bibl. 4.
87. PILIN, G. M. 634.725
An experiment in changing the nature of the gooseberry.
Vernalisation, 1940, No. 5 (32), pp. 129-30.

From many hybrids of the gooseberry (Krupnyi × Houghton) seedlings are obtained which are very prolific, very resistant to *Sphaerotheca* and ripen early, but with berries not much larger than those of Houghton. They grow on poor thin soil. The author crossed such a seedling with varieties having larger berries and followed Michurin's advice that gooseberry seedlings should be grown under the best possible conditions. Two branches of the bush were cut off at soil level. The resulting shoots, being young and therefore more suitable for the experiment than the parent plant, were layered, and in early September planted out in a bed prepared for them and liberally manured with greenhouse mould. Having been carefully tended meanwhile, in the following year at intervals of five days, after preliminary soaking of the soil, liquid manure was applied to them. The layered shoots then developed into strong plants with thick springy stalks ; their appearance was more cultivated than and their fruit twice as large as that of their parent plant ; the berries were in fact of good average size. The layered shoots retained the characteristics of the individual plants from which they were obtained. Thus a new variety of gooseberry was derived, early, with good yield of average-sized fruit, and a resistance to *Sphaerotheca* which, although somewhat lowered, was yet considerable.

88. PUTTERILL, V. A. 634.872 : 382.6
The export of fresh grapes from the Union of South Africa during the ten-year period, 1930-1939.
Bull. Dep. Agric. S. Afr. 225 (*Horticultural Series* 5), 1941, pp. 55.

This is the first of a projected series of reports summarizing fresh fruit exports from the Union of S. Africa for the 1930-39 period.

Notes are given of changes of grade during the period. The effect of amendments to regulations on grape exports during the period are discussed. Seasonal exports showed a progressive increase from 10,000 tons in 1930 to 42,000 tons in 1939. This rapid expansion in general greatly overshadowed any restrictive influences imposed by more critical standardization. Specialization in varieties is taking place and there is, undoubtedly, an improvement in the way grapes are grown for export. The tables, which take up more than three quarters of the bulletin, give statistics of amounts of different varieties exported, of localities supplying different grapes, of juice composition, of size of berries, of appearance of bunches and numerous other details.

89. SAVAGE, E. F., AND OTHERS. 634.848
Further studies with the muscadine grape.
Bull. Ga Exp. Stat. 217, 1941, pp. 36, bibl. 30.

A short treatise on the muscadine grape (*Vitis rotundifolia*) including comparisons with *V. labrusca*, cultivation methods suited to Georgia conditions, pests and diseases and their control and utilization. It produces good jellies and preserves and in addition a good wine with a characteristic flavour. As regards juice it is said to be delicious fresh but to be incapable of preservation by ordinary juice processing methods, since these destroy its flavour. Freezing the juice results in retention of good flavour but the method is awkward and thawing takes too long. As fresh fruit it is excellent eaten at once but the grapes rapidly deteriorate as the result of the exudation of juice at the point of attachment of the grape to the pedicel. Breeding has already yielded one variety, Yuga, which combines high quality, large sized bunch and persistent berries.

90. VAN HORN, C. W. 634.521-2.19 : 581.144.4
Delayed foliation of pecan trees in Arizona.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 87-94, bibl. 5.

Spraying with a 2-3% solution of DNO (4% of 2-4-dinitro-6-cyclohexylphenol and 96% oil) was found effective in stimulating initiation of growth within certain pecan varieties at Yuma, the stimulus compensating apparently for some lack of chilling. Where there had been ample chilling the treatment had no effect.

91. REED, C. A. 634.532
The present status of chestnut growing in the United States.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 147-52, bibl. 2.

Sweet chestnut growing in the U.S. is on the increase, the Chinese (*Castanea mollissima*) and Japanese (*C. crenata*) species being generally preferred owing to their blight resistance. Selection and hybridization is in progress. At present propagation is mainly by seed. Notes on cultivation are given.

92. SNYDER, J. C. 634.54
Filbert growing in Washington.
Ext. Bull. Wash. St. Coll. 263, 1941, pp. 20, bibl. 7.

Notes on cultivation, harvesting, husking, drying and grading filberts in the State of Washington. Barcelona and Du Chilly are the commonest varieties in the Pacific North-west at present, with a tendency for the Du Chilly to be best suited to Washington conditions. The characteristics of 7 other varieties are noted.

93. PASCUAL, A. 634.55
Almond growing throughout the world. (2)* taly.
Int. Rev. Agric., Rome, 1941, 32 : 147T-59T.

A short account including origin and production zones, climate and soil, cultivation, brief descriptions of some of the chief varieties and industrial uses of the almond in Italy.

* For (1) Spain, see *Ibidem*, 1940, 31 : 133T-48T, *H.A.*, 10 : 949.

94. REINECKE, O. S. H. 634.55
Almonds for the Cape Province.
Frug. S. Afr., 1941, 16: 287-8.

A guide to S. African growers who wish to establish almond orchards.

95. WHITEHOUSE, W. E., AND STONE, C. L. 634.574: 581.162.3
Some aspects of dichogamy and pollination in pistache.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 95-100, bibl. 14.

Proper selection of male trees to cover the whole blossoming period of the female pistache trees is found essential at Chico, California.

PLANT PROTECTION OF DECIDUOUS FRUITS.*

96. PETERSEN, A. 634.1/2-2.111
 Mitschurin's klimafeste Obst-Neuzüchtungen. (Mitschurin's hardy hybrids.)
Schweiz. Z. Obst- u. Weinb., 1941, 50: 411-6.

The author writing from Rakvere, Esthonia, notes that all Mitschurin's approved crosses are tested to stand -40°C . [$= -40^{\circ}\text{F}$.], are of short growing season and can stand winds, and at the same time are good croppers and resistant to pests and diseases. The quality of their fruits is good. He notes that Niels Hansen of South Dakota published a book some years ago dealing with fruit selection in U.S.S.R. and U.S.A. [presumably in English], in which some account is given of Mitschurin's work. Further Petersen himself has given a fuller account in German of the work in Möller's *Deutscher Gärtner-Zeitung*, Erfurt Nr. 28/1937 and subsequent numbers. Here he only has space to give short descriptions of some 3 pear hybrids with a note on a so-called vegetative pear [see also *Vernalisation*, 1938, No. 3, p. 91; *H.A.*, 9: 63], 20 apple, 10 cherry and 12 plum hybrids, produced by Mitschurin. The parents are noted in each case and notes are given on characteristics of tree or fruit.

97. RODIONOV, A., AND ZELENSKII, M. 634.1/2-2.111-1.411
Winter hardiness of apple and plum hybrids in relation to soil conditions.
Vernalisation, 1941, No. 1 (34), pp. 108-9.

At the Ukrainian Small Fruit Institute, Kitaev, Kiev, in the spring of 1939, 1-year-old hybrid apple and plum seedlings were planted out in two kinds of soil, namely, heavy clay and light sandy soil. In the spring of the following year, 1940, they were tested for hardiness, the damage which the tissues of cuttings had sustained under field conditions being then determined. From the results set out in tables it is shown that, without exception, the greatest winter hardiness was to be found in all the combinations of apple hybrids planted in sandy soil. Plums, on the other hand, with a few named exceptions including crosses involving Reine Claude blood, proved more hardy in clay soil. It was impossible to say why the behaviour of the combinations alluded to differed from that of others. To ascertain this a more detailed experiment will be necessary. For the time being, the authors merely wish to demonstrate that to acquire winter hardiness different varieties and combinations must be placed in different soils.

98. CLARKE, W. S., JR. 634.1/2-2.111
Temperature differences within an orchard and their effects on the fruit.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 25-30, bibl. 2.

Local differences in temperature within orchards were observed and were found to have considerable influence on frost severity.

99. MANEY, T. J. 634.11-2.111
Hardy stocks stood the shocks.
Wis. Horticulture, 1941, 32: 86.

The hardy intermediate stocks Hibernian and Virginia Crab proved to be the most important single factor in preventing cold damage at the Iowa Agricultural Experiment Station and elsewhere in the severe weather of November, 1940. A grower who has experimented with hardy stocks for 23 years showed how the stocks may be top budded over a period of 2-4 years and emphasized that the buds should be inserted on the main scaffold branches at a distance of 2-3 feet from the trunk. This practice results in less injury than when buds are set close to the trunk.

* See also 58-61.

100. FILINGER, G. A., AND CARDWELL, A. B. 632.111
A rapid method of determining when a plant is killed by extremes of temperatures.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 85-6.

The method devised at the Kansas Agricultural Experiment Station, Manhattan, consists of determining the electrolytic resistance. It is rapid. A portable apparatus could be taken and used on the spot after each adverse weather period. The plant need not be destroyed in the determination.

101. HADORN, C. 634.1/7-2.111
 Expertise über Frostschäden an Obstbäumen. (**Frost damage in Swiss orchards.**)
Schweiz. Z. Obst-u. Weinb., 1941, 50: 494-8.

Very great damage was done to fruit trees in Switzerland in the hard winter of 1939/40. Both young and old trees fell victims and among apples no variety showed particular resistance. The damage, which was characteristic, consisted in the loosening of the bark round the trunk up to a distance of 1 metre from the ground. The resulting exposure of the wood prevented the return of assimilates and consequently the nutrition of the roots. Since the supply of water from the soil was not cut, the trees remained green for some time and generally died in the summer of 1941. It has been suggested that the adoption of late years in Switzerland of a severe form of pruning known as the Oeschberg system contributed greatly to the damage, but since similar damage occurred in other parts of Central Europe where the system is unknown this theory remains unproved. The chief cause appears to lie in the peculiar climatic conditions of 1939. The summer was rainy and cool with little sun, the autumn on the other hand was sunny and generally very mild up to mid-December. Vegetative growth continued and had probably not entirely stopped when a sudden fall of temperature occurred in mid-December. This sudden cold spell persisted in the most unusual way through January and February and was the essential cause of the damage, which was incidentally worst in very exposed trees and those which had borne heavy crops. Some of the less severely damaged trees can be resuscitated or at any rate made to bear for a few years more by proper treatment. The following recommendations are made. (1) Thorough cleaning of the wounds; complete removal of the dead, dry or rotting remains up to the healthy wood and at the edge to the healthy bark. (2) Washing or spraying the wounds with 10% carbolineum. (3) The edge of the wounds must be covered with a thin layer of wax and the wood evenly and thinly with a good Stockholm tar [Baumteer]. This must be painted over once a year. (4) In winter the lower part of the stem up to 1 m. must be covered with sacking or straw.

102. VAN ZILE, L. G. 632.13: 634.1/7
What can be done after hail.
Amer. Fruit Grower, 1941, 61: 5: 7, 20-1.

The measures to be taken are designed to preserve what fruit remains and to present it at maturity in as good condition as possible. A full spraying programme must be started at once to keep pests and diseases from the damaged fruit. A reasonable amount of fruit thinning should be done with a view to increasing size. Picking date should be delayed to get additional size and colour. Packing should be just as carefully and attractively done as for unblemished fruit.

103. SMOCK, R. M. 634.11-2.19: 664.85.11
Studies on bitter pit of the apple.
Mem. Cornell agric. Exp. Stat. 234, 1941, pp. 45, bibl. 30.

The author after discussing a number of theories purporting to explain bitter pit gives an account of certain cultural measures taken by himself, mainly on Northern Spy and York Imperial apple trees, and of the results achieved. The following notes are taken from his summary. 1. Applications of nitrogen during the growing season to trees at a low nitrogen level increased the susceptibility of the apples to bitter pit. 2. Ringing seemed markedly to increase susceptibility. 3. Defoliation was the only orchard treatment which seemed to reduce susceptibility. This treatment removed leaf-fruit competition for water. 4. Partial ringing of the fruit stems in summer increased susceptibility. 5. Fruits on heavily thinned limbs and on naturally light crop trees were more susceptible. 6. On an unthinned limb the lateral fruits in a cluster were

more likely to pit, both on the tree and in store, than the terminal fruits. 7. Shading during the growing season increased susceptibility. 8. Delayed storage tended to result in early appearance of pit. Its appearance may be significantly delayed by prompt storage. 9. Gas storage delayed but did not reduce bitter pit. 10. The use of high relative humidities in store materially checked rate of development of pit. 11. There are indications that the use of shredded oil-paper may under some conditions increase bitter pit. 12. Waxing of fruit with emulsions appeared to delay materially the appearance of bitter-pit.

104. FITZPATRICK, R. E., AND WOODBRIDGE, C. G. 634.21-2.19 : 546.27

Boron deficiency in apricots.

Sci. Agric., 1941, 22 : 271-3, bibl. 3.

Observations at Summerland, B.C., on test apricot trees grown in sand provided with nutrient solutions since 1935 and on orchard trees show that the effects of boron deficiency in apricot range from complete inhibition of spring growth with subsequent death to comparatively mild leaf symptoms apparent only on the first leaves to develop. Characteristically, these effects occur together in the same tree, so that some branches die back completely while others grow more or less normally.

105. BRAUCHER, O. L., AND SOUTHWICK, R. W. 634.51-2.19 : 546.711

Correction of manganese-deficiency symptoms of walnut trees.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 133-6.

Manganese deficiency in walnuts is shown by the leaves becoming light mottled between the veins, the area adjacent to the veins remaining green. Later the mottled area becomes bronze in colour. There are no "little leaves" as in bad zinc deficiency. Trial was made in Ventura County, California, of treatment by injection of dry salts, injection of liquid salts, spraying and soil amendment with manganese sulphate and sulphur. Dry salt injection in summer or winter with manganese sulphate in amounts varying from 1 to 10 grams per hole ($\frac{3}{8}$ in. in diameter and 2-4 in. deep) gave highly successful results in the laboratory the following season. Some wood injury occurs, however, and the ultimate effect of this injury cannot be predicted. Liquid injections into the trunk at pressures of 100-125 lb. of manganous sulphate up to 75 grams per tree did not produce much leaf burn and gave [apparently] equally good response the following year. For spraying various amounts of manganese sulphate were used in different ways on the foliage. Leaf burn occurred when 20 and 25 lb. of the sulphate were used per 100 gallons, but concentrations of 5, 10 and 15 lb. per 100 gallons caused no such damage. The best response occurred when spraying took place in May and June, severely mottled leaves clearing up and remaining normal the rest of the season. No results are noted of soil treatment.

106. WINGARD, S. A. 631.521.6 : 632.3/4

The nature of disease resistance in plants I.*

Bot. Rev., 1941, 7 : 59-109, bibl. 295.

The author gives here a comprehensive review of the nature of disease resistance as disclosed by the voluminous literature on the subject. The problem is considered under different aspects as follows:—*Types of disease resistance.* Resistance may be due to physiological, chemical, morphological or structural peculiarities of a plant, to general hardiness of a plant or to meteorological conditions. *Misconception of disease resistance.* Varieties which escape disease owing to the fact that they mature early or late are not necessarily disease-resistant. Again disease-enduring plants may not show any great resistance to invasion by the disease. *Relation of environment to disease development.* 1. Soil temperature. Thus late blight of potato (*Phytophthora infestans*) may in a cool moist season do very great damage, but in a warm dry season very little, while the opposite holds good for such a disease as the yellows of cabbage caused by *Fusarium conglutinans*. 2. Nutrition. *Genetic behaviour of disease resistance.*

107. SNELLING, R. O. 631.521.6 : 632.6/7

Resistance of plants to insect attack.

Bot. Rev., 1941, 7 : 543-86, bibl. 567.

In this review the following plant characters are tabulated as having an influence on plant resistance to insect attack. Early or late maturity, unattractiveness for feeding or oviposition

* To be concluded in a later article.

repellence, pubescence, hardness, thickness or toughness of tissue, growth habit, incompatible food relations, physiological response in plant, tolerance to attack, recovery after attack, plant vigour, adaptation of soil and environment. Plants showing one or more of these characteristics are noted under the appropriate headings and the insect affected is named. The bibliography is comprehensive.

108. TAYLOR, G. G. 634.11-2.9

Experimental orchard at Huapai, Auckland.

N.Z. J. Sci. Tech., 1941, 22: 338A-47A, bibl. 7.

Three years' work on a neglected mixed apple orchard are recorded. The soil was a gum-land clay, with an iron pan at a depth of 15-20 inches in most parts of the orchard. Pruning had been neglected and there was much evidence of deterioration due to powdery mildew, scab, silver leaf, codling, bronze beetle (*Eucolaspis bruneus*), etc. The effects of pruning, draining and cultivation are described. Recommended spray programmes were shown to be effective and improvement on control methods are noted. A successful method is described for supporting partially blown over trees. Loose earth was removed from the exposed roots, broken ends were trimmed and the tree was raised and temporarily propped. At a point 2 ft. from the base a trench was dug 18 in. long and 18 in. deep. A log was set in it and secured with stout pegs. Fencing wire was passed round the log and the free ends attached by staples to leaders on the far side of the tree. A second wire was attached in a similar manner to other leaders. The wires were painted with bitumen and the earth was rammed back into the trench. Tension was placed on the tree by twisting the wires, the temporary props were removed and the earth packed round the roots.

109. ATKINSON, J. D., AND TAYLOR, G. G. 634.11-2.9

Renovation of a neglected orchard.

N.Z. J. Sci. Tech., 1941, 22: 347A-58A, bibl. 2.

An account of 5 years' renovation measures on a neglected orchard at Havelock North. Methods of pruning, cultivating, reworking, transplanting and wound dressing* are outlined. Details of disease control are given. Costs are recorded and the practical application of the data obtained is discussed.

110. PUTTEMANS, A. 632.3/4+632.8

Some data concerning the history of phytopathology in Brazil and the first notices of disease of plants in the country.

J. Agric. Univ. Puerto Rico, 1940, 24: 77-107, bibl. 104.

Translation of an article in *Rodriguésia*, 1936 (1937), No. 2.

111. STODDARD, E. M. 634.25-2.8

The X disease of peach.

Amer. Fruit Grower, 1941, 61: 8: 9.

X disease of peach is a virus disease first noticed in Connecticut in 1933. The leaves of attacked trees begin to develop yellow areas about 9 weeks after growth has started in the spring. These patches increase in size and number and their colour intensifies to orange and red while the leaf becomes stiff and brittle and finally drops with the exception of the tip leaves. It may take some years for the infection, beginning often in a single leaf, to spread over the whole tree. The chokecherry is considered to be the original host since diseased peach trees are always found in association with diseased chokecherries. The vector is unknown. The most satisfactory control for the chokecherry is to spray it with a herbicide. The longest distance so far recorded over which infection has travelled from chokecherry to tree is 300 yards.

112. BERKELEY, G. H. 632.8: 634.25 + 634.22

The "X" disease on peach and chokecherry.

Publ. Dep. Agric. Canada, Div. Bot., Sci. Serv. 678, 1941 (?), reprinted from

Canad. Hort. Home Mag., undated, pp. 2.

Notes on incidence and control of "X" virus on peach and chokecherry (*Prunus virginiana*) in the Niagara Peninsula.

* See *Ibidem*, 19: 313-6, *H.A.*, 8: 48.

113. BERKELEY, G. H. 632.8 : 634.22

Prune dwarf and Shiro line-pattern mosaic.

Publ. Dep. Agric. Canada, Div. Bot., Sci. Serv. 679, 1941 (?), reprinted from *Canad. Hort. Home Mag.*, undated, pp. 3.

Notes on prevention and control of 2 viruses new to Ontario on prune and Shiro plum.

114. RAWLINS, T. E., AND THOMAS, H. E. 634.23-2.8

The buckskin disease of cherry and other stone fruits.

Phytopathology, 1941, 31 : 916-25, bibl. 5.

The symptoms of buckskin virus disease of cherry, peach and certain other stone fruits in California are described. The type of rootstock in cherry markedly influences the symptoms. The susceptible and apparently immune species of the more important *Prunus* species are named.

115. ZELLER, S. M., AND WEAVER, L. E. 634.75-2.8

Stunt disease of strawberry.

Phytopathology, 1941, 31 : 849-51, bibl. 4, published as *Tech. Pap. Ore. agric. Exp. Stat.* 366.

A new virosis of strawberries in U.S.A., which stunts the plants and causes a cupping of leaves without appreciable reduction of chlorophyll, is transmitted by grafting of stolons and the intervention of the aphid, *Capitophorus fragaefolii*. The virus is referred to as *Fragaria virus 5* or, if a Holmes type name is required, as *Nanus cupuliformans*. It has some symptoms in common with yellow-edge in England but not similar to the symptoms of yellows shown by the host varieties used in the experiments.

116. WHITEHEAD, T., AND WOOD, C. A. 634.75-2.8-2.753

Aphid transmission of strawberry viruses.

Nature, 1941, 148 : 597-8, bibl. 1.

Experiments with a number of species of aphid failed to obtain transmission of *Fragaria virus 1* (yellow edge) or *Fragaria virus 2* (crinkle) other than by *Pentatrachopus (Capitophorus) fragariae* Theob. at Bangor University and *P. tetrarhodus* Walk. With the latter species transmission of crinkle was obtained from Royal Sovereign to *Fragaria vesca* L. in 1940 and 1941, the symptoms being indistinguishable from those produced by *P. fragariae*. The discovery is of academic interest in that it suggests a specificity of relationship between strawberry viruses and the genus *Pentatrachopus*. *P. potentillae*, however, failed to transmit the virus and work is in progress to discover the reason.

117. ARK, P. A. 634.55-2.314

The chemical eradication of crown gall on almond trees.

Phytopathology, 1941, 31 : 956-7, bibl. 2.

Satisfactory results were obtained by painting the galls, caused by *Phytomonas tumefaciens*, with sodium dinitro-cresol (sold as Elgetol), iodine or clove oil. The clove oil and the iodine were used in combination with methanol and glacial acetic acid. A sodium dinitro-cresol-methanol mixture gave 100% control of galls from 3 to 10 inches in diameter.

118. WORMALD, H., AND MONTGOMERY, H. B. S. 634.75-2.4

Leaf blotch of strawberries. A disease new to Britain.

Gdnrs' Chron., 1941, 110 : 180.

A leaf blotch of the strawberry bearing fructifications of *Phyllosticta grandimaculans* Bubák and Krieger is reported from several localities in Kent. The name "strawberry leaf blotch" is proposed to distinguish it from other strawberry leaf diseases. Since it has not yet been shown that the fungus is the actual cause of the blotching, recommendations for control are not offered. The authors consider that the disease may prove more destructive than leaf spot since the blotches destroy far more of the leaf surface.

119. LOUSTALOT, A. J., AND HAMILTON, J. 634.521 : 581.13 : 632.4

Effects of downy spot on photosynthesis and transpiration of pecan leaves in the fall.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 80-4, bibl. 7.

In tests at Brownwood, Texas, employing the apparatus and procedure used by Heinicke and Hoffman (*Bull. Cornell agric. Exp. Stat.* 577, 1933 ; *H.A.*, 4 : 178) the authors found that the

average photosynthetic activity of pecan leaves suffering from downy spot (*Mycosphaerella caryigena*) was 40.45% lower than that of normal leaves and the transpiration was less by 17.46%.

120. SMITH, R. E. 634.22-2.8

Transmission of diamond canker of the French prune.

Phytopathology, 1941, 31 : 886-95, bibl. 5.

A canker-forming disease peculiar to French prune trees is described from California. Characteristic symptoms are a rough, corky thickening of the bark on trunk and branches with diamond-shape excrescences at such places as pruning cuts or bark cracks. It appears to be caused by a localized virus and shows some resemblance in its behaviour to psorosis (scaly bark) of citrus. [From author's summary.]

121. MÜLLER, A. S. 634.37-2.4

Un estudio preliminar sobre el control de la roya de la higuera. (A preliminary study on the control of fig rust.)

Agric. Venezolano, 1940, 5 (49) : 35-7.

A rust, *Cerotelium fici* (Cast.) Arth, causes fig trees to drop their leaves and produce poor fruit. It is found that "Kolodust", a commercial powder with a sulphur base is more effective than liquid preparations because the lower surfaces of the leaves are more uniformly covered. The dust should be applied in the early morning when there is no wind and the leaves are still wet from dew. [Biol. Abstr.]*

122. CRUMB, S. E., EIDE, P. M., AND BONN, A. E. 632.721

The European earwig.

Tech. Bull. U.S. Dep. Agric. 766, 1941, pp. 76, bibl. 65, 15 cents.

A comprehensive treatise on the habits and control of *Forficula auricularia*, the earwig, which though perhaps not an economic pest is an appalling nuisance.

123. SMITH, L. G. 632.752 : 634.13

Pear psylla (*Psylla pyricola*) in Washington.

Ext. Bull. Wash. St. Coll. 255, 1941, pp. 8.

The pear psylla was discovered in the State of Washington for the first time in 1939. It has now become a considerable pest. An eradication programme is laid down.

124. MASSEE, A. M. 632.753 : 634.1/7

The Hemiptera-Homoptera (*Auchenorrhyncha*) associated with cultivated fruits.

J. Soc. Brit. Ent., 1941, 2 : 99-109, bibl. 19.

Brief notes are given for the forty species of leaf hoppers observed to breed on, or to be associated with, cultivated fruits. The species are arranged under host plants and more detailed notes are given of the economic species. [Author's summary.]

125. SMITH, C. F. 632.753 : 634.11

Control studies of the woolly apple aphid.

J. econ. Ent., 1941, 34 : 590.

Work at the Agricultural Experiment Station, Raleigh, N.C., has indicated that satisfactory control of woolly aphid on nursery stock can be obtained by watering the soil round the base of the tree with sodium cyanide dissolved in slightly alkaline water. All aphids were killed on the roots of approximately 95% of the trees treated when 0.2 to 1 gm. of sodium cyanide was used per tree in 1 quart of alkaline water. When concentrations were higher than 1 gm. to the quart injury to the tree occurred.

126. BRODY, H. W., CHILDERS, N. F., AND MARSHALL, G. E. 634.8-2.753

A study of leafhopper feeding injury to food manufacture and water-vapor loss of grape leaves.

Amer. Fruit Grower, 1941, 61 : 8 : 6, 14.

Investigations at Ohio and Purdue University show that serious injury can be caused to vineyards by even moderate infestations of leaf hopper. This injury is discussed. Control is best obtained by a thorough nicotine spray application to destroy the overwintering adults before egg-laying.

* Abstract provided by the Editors of Biological Abstracts.

127. HAYWARD, K. J. 632.78 : 635.25
La "polilla negra" del duraznero (*Cydia molesta* Busck). (**Oriental peach moth.**)

Circ. Est. exp. Agric. Tucuman 99, 1941, pp. 10.

A study of the biology and control of the oriental peach moth (*Cydia molesta*) in the Argentine.

128. WASHINGTON AGRICULTURAL EXPERIMENT STATION, AND OTHERS. 632.78 + 632.654.2 + 632.752
Recommendations for codling moth, orchard mite and scale control in Washington for 1941.

Ext. Bull. Wash. St. Coll. 266, 1941, pp. 12.

The use of the following sprays for codling moth are discussed:—Lead arsenate, mineral oil other than kerosene, kerosene, fish oil, soaps and spreaders, nicotine sulphate, fluorine compounds. The control is discussed of the Pacific mite and of the European red mite and brown mite. Dormant applications of lime-sulphur and oil are recommended for scale.

129. CARDINELL, H. A., TOENJES, W., AND HAYNE, D. W. 634.1/2-2.693.2
A fruit tree coating effective against cottontails.
Quart. Bull. Mich. agric. Exp. Stat., 1941, 24 : 65-8.

An effective repellent against orchard tree injury by cottontail rabbits (*Sylvilagus floridanus mearnsii*) was made by dissolving powdered rosin (7 lb.) in alcohol (1 gall.). The rosin dissolves in 24 hours. No heat should be used. One coating applied to the trunks with a brush in autumn when the bark is dry will last the winter. Hares and field mice were not repelled.

130. GEYER, J. W. 632.51 : 632.96
The biological control of the "rondeblaar" prickly pear.
Fmg S. Afr., 1941, 16 : 301-4.

Opuntia tardospina Griff., the prickly pear species known as "rondeblaar" in S. Africa, cannot be controlled by *Cactoblastis* or by the cochineal insects *Dactylopius confusus* and *D. coccus* which attack the jointed cactus and the common prickly pear. The mealy bug, *Dactylopius opuntiae*, imported from Australia as a means of attacking the common prickly pear has, however, proved very effective against rondeblaar also. Biological notes are given.

131. BATES, G. H. 632.954
Vanadium pentoxide as a catalyst for sodium chlorate in weed destruction.
Nature, 1941, 148 : 753.

Observations are briefly described which suggest the possibility of enhancing the value of sodium chlorate as a herbicide by the employment of a catalyst such as vanadium pentoxide.

312. ARNOLD, H. C. 632.951
Harvesting pyrethrum flowers.
Rhod. agric. J., 1941, 38 : 597-8.

The present high price of good quality pyrethrum flowers (£100 per ton at the factory in Durban) should encourage care in gathering. The price depends on the pyrethrin content and this in turn depends largely on gathering at the correct stage. Research shows that the most economical time for harvesting is when from half to two-thirds of the small yellow florets composing the central disc have opened but those in the centre of the disc are still closed. This stage is reached in from 6 to 10 days after the white ray florets begin to open. In field practice this means that the wide open flowers are picked every 3 to 6 days. No stalk must be left on the head. Instructions are given for drying and packing. The latter should be in fairly airtight containers or waterproof bags since the flowers readily absorb atmospheric moisture. Fairly waterproof clean grain bags may be used provided they are stored after filling in a closed, dry building.

133. SOUTHWICK, F. W., AND CHILDERS, N. F. 634.11 : 581.132 : 632.952
Influence of bordeaux mixture and its component parts on transpiration and apparent photosynthesis of apple leaves.
Plant Physiol., 1941, 16 : 721-54, bibl. 29.

1. The influence of bordeaux mixture and its component parts on the rate of photosynthesis and transpiration of Stayman Winesap apple leaves was measured in an environment-control

chamber where temperature, light, and humidity were controlled. 2. Under the conditions of these experiments photosynthesis was reduced at least temporarily by applications of bordeaux mixture regardless of the temperature, light, humidity, or soil moisture conditions. 3. The data presented indicate that the influence of bordeaux mixture on the photosynthetic process is primarily physiological rather than mechanical. The soluble copper fraction within bordeaux appears to be directly related to the retarding effect of this spray on photosynthesis. 4. The results of these experiments indicate that the temperature at which bordeaux may be expected to instigate visible injury to apple foliage lies between 60° and 70° F. 5. The transpiration rate of illuminated mature apple leaves appears to be uninfluenced or somewhat depressed by bordeaux mixture and its component parts. 6. The general effect of bordeaux mixture applied to young apple trees growing under low soil moisture conditions was a slightly reduced rate of transpiration. [Authors' summary.]

134. SUGIYAMA, T. 634.13 : 581.132 : 632.951/2

Effects of spraying on photosynthesis. [Japanese.]

J. hort. Ass. Japan, 1941, 12 : 24-33, bibl. 22.

Trials were made on Chojuro pear with various sprays, measurements being based on the increased weight in particular areas punched out of the leaves. *Machine oil emulsion*. Assimilation fell sharply on the day following the spraying and then gradually rose again to normal, the rehabilitation of the process being quicker the more refined and more concentrated the emulsion and the more viscous the oil. *Lime-bordeaux*. Neither with hypo- or hyper-lime bordeaux was any effect visible on the following day. *Lime-sulphur*. Assimilation fell appreciably on the following day but was nearly normal a few days later.

135. CUPPLES, H. L. 632.951/2 : 634.1/7

Relation between wetting power of a spray and its initial retention by a fruit surface.

J. agric. Res., 1941, 63 : 681-6, bibl. 11.

The relation between the wetting power of a spray mixture and its retention on the sprayed surface has been investigated by spraying a rotating apple with spray solutions of varying wetting power; as measured by their spreading coefficients on mineral oil, and determining the retention of spray mixture at the point of run-off. Plots of the spreading coefficients against the corresponding retentions of spray mixture show that there is a close relationship between these values. [Author's summary.]

136. BELL, H. P. 634.11-2.952

The origin and histology of bordeaux spray russetting on the apple.

Canad. J. Res., 1941, 19, Sec. C, pp. 493-9, bibl. 9.

The work reported was done at the Dominion Experimental Station, Kentville, N.S. The author's abstract runs as follows :—Apples of the McIntosh Red variety were sprayed at about the time of full bloom in 1939 and 1940. The origin and structure of the resultant russet tissue is described. The first apparent injury is a browning of the epidermal cells at the base of the hairs. The growth of these browned cells is inhibited and, owing to this, cracks occur as the fruit enlarges. Adjacent hypodermal and cortical tissue is exposed and killed. Cork cambiums and cork are formed in the cortex. This cork is different in origin from normal russet cork, which originates in the epidermis. The further enlargement of the fruit causes the cracks to multiply, extend tangentially, and deepen. All tissues external to the innermost point of fissure penetration become killed. The final scurf-like patches of scar tissue are a mixture of dead epidermis, hypodermis, cortex, cork and cork cambiums. This scar tissue is not true cork.

137. CHRISTOPHER, E. P. 634.11-2.952 : 581.144

Influence of sulphur sprays on the trunk diameter of young apple trees.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 8-10, bibl. 6.

Two years' data are recorded showing the result of various lime-sulphur, sulphur paste and sulphur dust treatments on the trunk growth of 1- and 2-year-old McIntosh and Baldwin apple trees planted in 1939 in Rhode Island. The experiment continues.

138. DAVIS, L. D. 634.25
Split-pit of peaches. Estimation of time when splitting occurs.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 183-9, bibl. 2.
 MINISTRY OF AGRICULTURE, LONDON. 634.725-2.654.2
Gooseberry red spider (*Bryobia praetiosa*).
Advis. Leaflet. Minist. Agric. Lond. 305, 1941, pp. 3.
 RHODES, A. F. P. 632.952
Studies on the mechanism of fungicidal action. I. Preliminary investigation of nickel, copper, zinc, silver and mercury.
Ann. appl. Biol., 1941, 28: 389-405, bibl. 13.
 CALIFORNIA. 612.014.46: 632.95
Economic poisons 1939-1940.
Spec. Publ. Dep. Agric. Calif. 180, 1940, pp. 130.

VEGETABLE GROWING AND STIMULANTS.

139. WALLACE, J. C. 635.1/7
Successional vegetable cropping.
Agriculture, Lond., 1941, 48: 169-71.

The planning and running of an area devoted to a continuous succession of vegetable crops are described. The essentials are that the land is suitable, in good heart and clean. It will often be advisable to autumn fallow it after a few seasons' successional cropping.

140. MINISTRY OF AGRICULTURE, LONDON. 635.1/7 + 664.583
Crops for pickling.
Bull. Minist. Agric. Lond. 103, 1941, pp. 19, 9d.

Notes are given on the cultivation of the following crops for pickling:—gherkins, onions, red cabbage, cauliflower, beetroot, and shallots. Other pickle crops mentioned are walnuts and damsons and other fruits for sweet pickle. The process of brining and the storage of cured vegetables prior to pickling are described. A short appendix lists 17 additional flavouring agents used in particular pickles.

141. ANON. 635.1/7: 631.531
Production of root and vegetable seeds [in Eiré].

J. Dep. Agric. Eiré, 1941, 38: 355-8, being Spec. Leaflet. Dep. Agric. Eiré 15.

Import difficulties necessitated the home production of root and vegetable seed for sowing in 1942 in Eiré. These are practical notes on how to do so on the assumption that only few growers would have prepared for it by sowing in July or August 1940 and so obtaining small plants for thinning or planting out for seed production in 1941. Hence the necessity arose to plant out in the spring of 1941 roots from the 1940 crop from which seed could be harvested in the autumn of 1941. It is suggested that planting out could start any time after the end of February if the soil allowed. Of turnips or mangolds 50 roots should produce enough seed to sow an acre. The land should be well cultivated and well-rotted dung applied about 10-12 tons per acre. The mother roots should be set upright and firmly about 24 inches apart each way and covered with soil to a depth of about 1 inch (root crops) or to the base of the main outer leaves (cabbages and other green crops). In mangolds branching should be encouraged by lopping the main shoot as soon as growth begins. Vermin must be prevented. Weeds must be kept down. When about 6-9 inches high the plants should be moulded up to encourage the development of flower heads and protect against wind. The crop should be as fully ripe as possible before harvesting. The stems should be cut well below the junction of the lowest seed-bearing stalks. They must be dried by stooking or hanging under cover and the seed itself after threshing again needed drying. Generally speaking the cultivated plants in each of the following groups would only intercross amongst themselves:—I. Swedes, turnip, rape. II. Cabbage family. III. Mangold and sugar and garden beet. Carrots, parsnips, parsley and celery while not intercrossing might do so with closely related wild forms. Hence the varieties in any one of the above groups should not be grown close to one another. In practice there should be an interval of 300-400 yards.

142. ANON. 635.1/7 : 631.531

Economy in the use of root seeds.

J. Dep. Agric. Eiré, 1941, 38 : 359-60, being *Spec. Leaflet. Dep. Agric. Eiré* 17.

Notes on the use of the dibble (illustrated) and a very much smaller amount of seed than usual, e.g. 3-4 lb. instead of 12-15 lb. in the case of mangolds, combined with the operation of transplanting by hand if necessary.

143. HARMER, P. M., AND BENNE, E. J. 635.1/7 : 631.828

Effects of applying common salt to a muck soil on the yield, composition and quality of certain vegetable crops and on the composition of the soil producing them.

J. Amer. Soc. Agron., 1941, 33 : 952-79, bibl. 10.

The following effects were obtained by the application of salt as a fertilizer in conjunction with a phosphate potash mixture on Michigan muck soil. Increase of yield occurred in mangel, sugar beet, Swiss chard, table beet, celery, celeriac, cabbage, kale, kohlrabi, radish, rape, turnip. The increases and decreases of various nutrient element contents in the treated crops are recorded. The application of salt without potash as well was harmful, resulting in very low yields and various symptoms of ill-health. Suitable amounts of salt per acre are recommended for each of a number of crops, and those which do not require salt are also listed. The relation of potassium and sodium in the metabolism of the salt-responsive crops is summarized.

144. TIEDJENS, V. A. 635.1/7 : 631.8

Use of liquid fertilizers for growing vegetables.

Agric. News Letter (Du Pont), 1941, 9 : 17-21.

Experiments carried out at the New Jersey Agricultural Experiment Station on the formulation and efficiency of liquid fertilizers, their amounts and methods of application to commercial vegetable crops. These matters are here discussed.

145. LAUDE, H. M. 577.15.04 + 631.83 : 581.14

Combined effects of potassium supply and growth substances on plant development.

Bot. Gaz., 1941, 103 : 155-67, bibl. 17.

The investigation reported deals with the effects, at different levels of potassium, of growth substance supplied in the nutrient medium to sand cultures of red kidney bean (*Phaseolus vulgaris*). Under certain levels of nutrition increases as great as 12.5% in total plant dry weight were obtained by indoleacetic acid supplied at the 10^{-9} concentration and dry weight of roots increased 35-50% at the 10^{-6} concentration of naphthalene acetamide though the growth of tops was significantly reduced. Indoleacetic acid appeared unable to replace potassium or enhance its utilization under deficiency conditions. Indoleacetic acid did not hasten the time of flowering nor did naphthalene acetamide hasten the appearance of flower buds. Neither of them increased the number of leaves. Other results are also noted.

146. METCALFE, C. R. 632.184 : 631.544

Damage to greenhouse plants caused by town fogs with special reference to sulphur dioxide and light.

Ann. appl. Biol., 1941, 28 : 301-15, bibl. 15.

the paper describes three main lines of investigation undertaken in a study of the effects of sulphur dioxide and light on greenhouse plants in connexion with plant injury caused by town fogs. (1) The SO_2 content of the air was examined and an attempt made to correlate the damage done with the extent of pollution. (2) The effect of very low concentrations of SO_2 under different conditions was studied. (3) Attempts were made both in laboratory and greenhouse to find means of removing SO_2 from the air, and to determine whether air purified by these methods is harmless to plants. Injury was found to be roughly proportional to the concentration of atmospheric SO_2 and not to the reduction of light caused by fog, although subjecting certain plant varieties to light of reasonable intensity from mercury vapour lamps and/or neon tubes for 12 hours daily had beneficial effects such as improved growth and earlier or more prolonged

flowering. Many of the conclusions that can be drawn agree closely with the empirical opinions of gardeners.

147. GREEN, D. E.

632.3/4 : 635.1/7

Hygiene in the war-time vegetable garden. X.*J. roy hort. Soc.*, 1941, 66 : 417-22.

The diseases of carrot, parsnip, scorzonera and salsify are dealt with. Carrot diseases are mostly those of storage and comprise soft rot (*Bacterium carotovorum*), black rot (*Alternaria radicina*), violet root rot (*Helicobasidium purpureum*), sclerotinia rot (*S. sclerotiorum*). Carrot diseases in the field are damping off (*Pythium* sp. and *Corticium solani*), splitting due to rains following drought causing the prematurely hardened outer layer of the root to crack, and clay-burn surface canker or pit possibly due to heavy wet patches of soil sticking to the roots and interfering with proper aeration, acid soil injury causing bluish colour and stringy roots. Parsnips suffer from a few unimportant foliage diseases. Their chief trouble is canker or "rust" originating in a cracking of the outer skin which the parsnip, unlike other roots, makes no attempt to heal. *Bacterium carotovorum* then often enters and causes soft rot. Preventive measures consist in liming, supplying potash if deficient, avoiding early sowing and too rich ground. Scorzonera may get white blister (*Cystopus cubicus*) while salsify in addition to white blister is attacked by rust (*Puccinia hystereum*) and mildew (*Erysiphe cichoracearum*).

148. SHROPSHIRE, L. H.

632.6/7 : 635.1/7

Insect control for garden crops.*Circ. Ill. Coll. agric. Ext. Serv.* 514, 1941, pp. 54.

Over 50 species of insect seriously damage garden crops in Illinois. This circular describes the more common of them and gives specific directions for their control. They are either general feeders, or attack particular crops or groups of crops:—cabbage; potato; sweet corn; tomato and egg plant; vine crops including cucumber and squash; onion; bean; asparagus; beet, spinach, lettuce, celery and dill; carrot and parsnip; sweet potato.

149. BALD, J. G.

633.491

A report of agricultural features of the Australian potato industry.*Pamphl. Coun. sci. industr. Res. Aust.* 106, 1941, pp. 72 (photolithographed).

The features of the industry examined and discussed here are (1) the physical environment in which potatoes are being grown in Australia, (2) the agricultural practices adopted in their cultivation and (3) the potatoes themselves, varieties and varietal characteristics, diseases and pests, improvement by selection, breeding, etc. Average yields for the period 1927/28 to 1936/37 are very low, about 2.6 tons per acre, the Queensland average being only 1.61 tons as against 4.45 and 3.83 tons of Western and South Australia respectively. This review should, therefore, prove helpful.

150. RUSSELL, E. J., AND GARNER, H. V.

633.491-1.8

The Rothamsted experiments on the manuring of potatoes. II.* Effects of inorganic and organic manures on the yield of potatoes. III. The effects of fertilizers on the habit of growth and other characteristics of potatoes. General summary.*Emp. J. exp. Agric.*, 1941, 9 : 217-26, 227-35.

In Part II tabulated data on the results of the trials are discussed. They concern the effects of magnesium and sodium salts and of chloride, of comparative methods of application, e.g. broadcasting or in the bout, of farmyard manure, of poultry and other organic manures. In Part III the authors summarize their findings and make recommendations which act as a useful framework on which to base manurial programmes for potatoes. The programme will be modified according to conditions of soil, economy, etc. Briefly these recommendations are:—Farmyard manure must be the basis; 15 tons per acre may give 2 or 3 extra tons of potatoes. A normal nitrogenous manuring should consist of 3-4 cwt. of sulphate of ammonia. Superphosphate applications must depend largely on soil; heavy soils being more responsive can take up to 4 cwt. and heavy

* For I see *Ibidem*, 9 : 195, *H.A.*, 11 : 1224.

fen soils 5 cwt. or more, while light soils may not be able to take more than 3 cwt. As regards potash 2 cwt. sulphate of potash should be a normal level to be increased if supplies of dung are short or decreased if larger. The lower grade K salts may involve loss of crop as their chlorides reduce yield and there is no evidence that either sodium or magnesium normally increases it.

151. TEAKLE, L. J. H., MORGAN, E. T., AND TURTON, A. G.

631.811.9 : 633.491 + 635.1/7

III. Experiments (with micro-elements) with potatoes, vegetables and other crops in the Albany district.

J. Dep. Agric. W. Aust., 1941, 18 : 96-125, bibl. 3.

The crops used included potatoes, tomatoes, peas, maize, swedes and onions. Copper, manganese and zinc sulphates, boron and magnesium were tested. The crops were found to differ in their response to micro-elements on deficient soils. For instance, on marly soils copper was of first importance for tomatoes and manganese for potatoes. Analysis of crop material in certain cases, e.g. potatoes and tomatoes for copper, provide little evidence of soil deficiency or response to fertilizer treatments. In other cases analytical data have considerable value for diagnostic and nutritional viewpoints.

152. SMITH, O.

633.491-1.8

Potato fertilizer and nutrition studies in 1940.

Amer. Potato J., 18 : 333-48, bibl. 64.

A very useful review of the results of investigations published in 1940 and the latter part of 1939 on the manuring and nutrition of potatoes. With 5 exceptions none of the 64 references quoted is earlier than 1939.

153. ARNOLD, H. C.

633.491

Cutting seed potatoes.

Rhod. agric. J., 1941, 38 : 599-603.

To cope with the hot dry conditions in which they have to be planted for reasons explained in the course of the paper, cut seed potatoes sections in Rhodesia should weigh at least 3-4 oz. and have one or two short sturdy sprouts. Since the sprouts at the apex inhibit to a great extent those at the heel it is better to cut sprouted potatoes longitudinally. Potatoes to be cut into more than 2 pieces should be dealt with before sprouting has started. To encourage development of the protective layer of suberin over the cut surface the cut tubers should be kept in a moist dark atmosphere, i.e. covered with sacks or other protective material for not more than 2 days. After this they should be stored in a cool light airy place for sprouting. With varieties which do not respond well to cutting it is suggested from experiments that the tubers should be cut longitudinally nearer to the heel end but not completely detached until planting time. They should be sprouted in the usual manner. The reason for the speedy deterioration of imported potato stocks is ascribed to the necessity for keeping the seed tubers in high temperatures for some months after they have reached the optimum time of planting. Cropping power of imported strains could almost certainly be largely maintained if the seed could be kept in cold storage at 40° F. until climatic conditions were cooler and more favourable to growth.

154. TILFORD, P. E.

633.491-2.1 + 2.3/4 + 2.8

Ohio potato diseases.

Bull. Ohio agric. Exp. Stat. 615, 1940, pp. 35.

The author deals with the incidence and prevention or control of potato diseases in Ohio under the headings:—Degenerative [virus] diseases, Leaf and stalk diseases, and Tuber diseases. He gives the following directions for adequate control. Plant seed known to be free from disease, or, if there is evidence of *Rhizoctonia*, treat it before planting with one of the mercury compounds. If seed is to be cut, cut it immediately before planting. Plant in well-drained, well-manured soil that has not grown diseased potatoes in previous years. Spray or dust to prevent losses from leaf diseases and insects during the growing season. At digging time dry the tubers before storing.

155. HOPKINS, J. C. F. 633.491-2.1 + 2.3/4 + 2.8
Diseases of fruit, flowers and vegetables in Southern Rhodesia. 5. Diseases of potatoes.
Rhod. agric. J., 1941, **38** : 672-90, bibl. 4.

A full, illustrated account of potato diseases and their control in S. Rhodesia.

156. EDDINS, A. H. 633.491-2.314
Effect of sulfur and limestone soil treatments on potato scab in a sandy soil.
Amer. Potato J., 1941, **18** : 312-6, bibl. 10.

Although the use of limestone and sulphur did tend to reduce the incidence of scab in a fine sandy soil, such treatment was evidently uneconomic.

157. NOTTINGHAM, J. O., AND RAWLINS, W. A. 633.491-2.753
The control of potato aphids on Long Island.
Amer. Potato J., 1941, **18** : 305-11, bibl. 4.

The potato aphids *Macrosiphum solanifolii* and *Myzus persicae* were excellently controlled on Long Island by nicotine spray and nicotine fumigation.

158. KRANTZ, F. A., AND EIDE, C. J. 633.491-2.314
Inheritance of reaction to common scab in the potato.
J. agric. Res., 1941, **63** : 219-31, bibl. 7.

MINISTRY OF AGRICULTURE, LONDON. 632.8 : 633.491
Potato leaf roll.

Advis. Leaflet. Minist. Agric. Lond. **278**, 1941, pp. 4.

MINISTRY OF AGRICULTURE, LONDON. 633.491-2.651.3

The potato root eelworm (*Heterodera schachtii*).

Advis. Leaflet. Minist. Agric. Lond. **284**, 1941, pp. 4.

ARK, P. A. 633.491-2.314 : 546.15

The use of iodine in the control of potato ring rot and scab.

Phytopathology, 1941, **31** : 954-6, bibl. 6.

RUEHLE, G. D. 633.491-2.4

A *Xylaria* tuber rot of potato.

Phytopathology, 1941, **31** : 936-9, bibl. 3.

159. RALEIGH, G. J., LORENZ, O. A., AND SAYRE, C. B. 635.11 : 632.19 : 546.27
Studies on the control of internal breakdown of table beets by the use of boron.
Bull. Cornell agric. Exp. Stat. **752**, 1941, pp. 16, bibl. 5.

Four important factors which make boron deficiency of beets a serious problem on Ontario and New York soils are high boron requirement of beet, alkaline soil reaction, use of little or no manure and soil moisture deficiency. The evidence indicates that when high yields accompany unfavourable conditions, internal breakdown is likely to be more severe than if yields are low as a result, say, of inadequate manuring. Under the prevailing conditions 50 lb. of borax per acre gives satisfactory commercial control. Such quantities of borax should not be used on more acid soils and will almost certainly be injurious on any soil to boron-sensitive crops such as beans grown in the following year.

160. LEHR, J. J. 635.11 : 631.84 : 546.33
The importance of sodium for plant nutrition : II. Effect on beets of the secondary ions in nitrate fertilizers.
Soil Sci., 1941, **52** : 373-9, bibl. 6.

Experiments in Holland with beets, using different fertilizers as sources of nitrogen, show that from the point of view of economic use of fertilizers it makes a very great difference which secondary ion is present in addition to the nitrate ion. Thus the yield is substantially higher with NaNO_3 than with $\text{Ca}(\text{NO}_3)_2$. The effect of the secondary ion is found to be as important as that of the nitrate itself. The effect of the secondary ions is most pronounced in weakly buffered, i.e. sandy soils.

161. LYNCH, P. B. 635.12 : 632.19 : 546.27

Control of brown heart of turnips and swedes.

N.Z. J. Agric., 1941, 63 : 109-12.

As the result of experiments during the past 3 years at Marton Experimental Area, N.Z., the following recommendations are made for the control of brown heart (mottle heart) in turnips and swedes. 1. Broadcast 40 lb. of borax per acre before or after sowing and repeat if heavy rain occurs soon after the first application. 2. Use heavy rather than light rates of seeding. 3. Swedes Wilhelmsburger and Vilmorin may be used where the disease is known to be severe. A compound borax which can be safely drilled with the seed is needed. Investigations, though suspended, are not concluded.

162. ANON. (VICTORIA DEPARTMENT OF AGRICULTURE). 635.25 : 631.531

Australian brown onion seed for Britain.

J. Dep. Agric. Vict., 1941, 39 : 312-3.

Seed of the Australian brown onion is to be grown by Australian garden owners for despatch to Britain. Cultural instructions are given of which those relating to harvesting and curing are abstracted here. The seed heads are gathered when the stalks have taken on a yellow appearance and the seed pods have become white and papery and tend to burst, showing the seed. Delay now may mean that the seed will fall. The heads are gathered with a few inches of stalk attached and are dried in the sun on sheets of canvas or other suitable material. When dry the seed heads are placed under cover and lightly flailed or trodden out. If on large plots the seed heads may be dried in chaff bags half filled and hung in the sun, e.g. over a fence. Preliminary threshing is done by trampling before the bags are open. Final cleaning is done by the Department of Agriculture.

163. EVANS, H. H. 635.31

Asparagus production in British Columbia.

Hort. Circ. Dep. Agric. Brit. Columbia 75, 1941, pp. 17, bibl. 3.

There is still room for expansion of asparagus growing in British Columbia although the acreage has more than trebled in the past 8 years and amounted in 1940 to some 548 acres, 470 of it being in bearing. The author deals with selection, planting and subsequent management including harvesting and handling, pests and diseases and production costs.

164. EVANS, A. C. 632.753 : 635.34 + 635.65

Physiological relationships between insects and their host plants. II. A preliminary study of the effects of aphides on the chemical composition of cabbage and field beans.

Ann. Appl. Biol., 1941, 28 : 368-71, bibl. 5.

Infestation of cabbage by the aphid, *Brevicoryne brassicae*, caused a marked decrease in the amount of carbohydrate synthesized but smaller decreases in fat, crude protein and other constituents. Infestation of field beans by the aphid, *Aphis fabae*, did not have any great effect on the chemical composition of the crop. [Author's summary.]

165. PRESTON, N. C. 632.42 : 635.34

Experiments on the control of club root of *Brassicae* in gardens and allotments.

Ann. appl. Biol., 1941, 28 : 351-9, bibl. 6.

Although in a trial of 10 different substances mercuric chloride in 1/1,500 solution gave consistently the best results in the control of club root of *Brassicae*, significant practical control was also obtained with calomel, a mercury-zinc amalgam and with a proprietary compound, brassisan. Calomel has the additional advantage of efficacy against cabbage fly, even when applied beneath the soil.

166. OLDHAM, C. H. 635.347

An accommodating kale.

Fruitgrower, 1941, 92 : 374.

Attention is called to the recently introduced kale, Hungry Gap, and its advantages. These are tolerance of a variety of soils including those wet in winter and those with some degree of acidity. Only normal soil fertility is necessary and it appears to thrive in a rotation after a crop

that has caused exhaustion of the soil. Its period of edibility can be determined by the time of sowing the seed and by the subsequent cultivations. It has proved hardy in severe winter weather when other brassicas have been killed outright.

167. EVANS, H. H. 635.52

Lettuce production in British Columbia.

Hort. Circ. Dep. Agric. Brit. Columbia 74, 1941, pp. 18.

Two groups of lettuce are grown in British Columbia, the loose-leaf open group, Grand Rapids variety being the standard, and the heading group, the two main types here being the Iceberg, and Cos or Romaine types. The aim of the circular is to place before the commercial producer the fundamental requirements for the best performance of the lettuce crop and to tell of some of the author's experiences with the crop over a number of years. In addition notes are given on grading and packing and on costs of producing and handling.

168. WONG, C. Y. 581.163 : 635.615

Chemically induced parthenocarp in certain horticultural plants, with special reference to the watermelon.

Bot. Gaz., 1941, 103 : 64-86, bibl. 20.

Parthenocarp was successfully induced in varieties of watermelon by application of growth substances to the stigmas or cut styles. A mixture of two growth substances gave better results than when either was used alone, e.g. acenaphthene and naphthalene-acetic acid were more successful together than separately. Hormone-treated flowers that did not mature parthenocarpic fruit persisted on the vine, possibly because the hormones prevented the formation of an abscission layer. Untreated and unpollinated ovaries were shed within 10 days. Pretreatment of watermelon seeds with proper dosages of colchicine prevented development of integuments into seed coats on parthenocarpic fruits, but not if the mixture was applied to the cut style. There were great varietal differences in responses to the various treatments and the percentage of fruit reaching maturity among the treated plants was very much less than that of the self-pollinated controls. Smaller scale trials were also made on pickling cucumber, pumpkin, capsicum, tomato, eggplant, and strawberry.

169. BEWLEY, W. F. 635.64 : 631.521.6

New tomato "Vetomold".

Fruitgrower, 1941, 92 : 430, and *Market Gr.* 1941, 19 : 10 : 2.

Seed of the hybrid tomato "Vetomold" produced by Dr. A. N. Langford, Vineland Experiment Station, Canada, has been issued to 95 English growers by the Cheshunt Research Station for trial. Reports now received indicate that the tomato is immune to the leaf mould fungus, *Cladosporium fulvum*, and shows, when grown out of doors, resistance to the potato blight fungus, *Phytophthora infestans*, and that under suitable conditions it can produce a heavy crop of good quality fruit. The plant is a hybrid of the red currant tomato, *Lycopersicum pimpinellifolium*, and Potentate of the strain grown at Cheshunt. The author remarks in conclusion that the result is a triumph of plant breeding and that the plant is well worthy of a trial in any nursery where leaf mould is serious, especially as a late or second crop.

170. CUNNINGHAM, G. H. 635.64 : 631.521.6

Disease-free seed for tomato growers.

Orchard. N.Z., 1941, 14 : 9 : 23-4.

Leaf-mould of tomatoes (*Cladosporium fulvum*) causes much damage in New Zealand. Trials were made under glass with imported seed of some of the new immune varieties. The following results were obtained :—Kondine Red, unsprayed 2 lb. 5 oz. per plant, sprayed 3 lb. 4 oz. ; Bay State 5 lb. ; Globelle 3 lb. ; Vetomold 5 lb. 11 oz. The Canadian produced Vetomold gave the best results. It is immune to 4 of the 5 strains of *Cladosporium fulvum* which have been discovered and the fifth does not appear to be present in N.Z. It will therefore be important to see that all further importations of tomato seed into N.Z. should be made only through an organization that can ensure that they are disease free. Since growers cannot themselves raise seed under such conditions that cross-pollination is avoided and so immunity maintained, the Plant Diseases Division is prepared to undertake the work and to sell to growers seed both true

to type and guaranteed free from bacterial canker and tobacco mosaic. Such a scheme, if supported by the growers, would do much to help the N.Z. tomato industry to carry on, without materially increasing production costs.

171. STRONG, M. C. 635.64 : 577.15.04

The effect of various growth-promoting chemicals on the production of tomato fruits in the greenhouse.

Quart. Bull. Mich. agric. Exp. Stat., 1941, **24** : 56-64, bibl. 15.

Indolebutyric acid in hydrous lanolin applied to the ovaries of greenhouse tomatoes at anthesis or when the corolla was completely reflexed increased the number of fruits set and their average weight above those resulting from hand pollination and decreased the length of time required for ripening. Emasculation was not necessary. With improved technique this method of fruit production should be practical for growers.

172. HOWLETT, F. S. 635.64 : 577.15.04 : 581.163

Effect of indolebutyric acid upon tomato fruit set and development.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, **39** : 217-27, bibl. 2.

Indolebutyric acid proved to be very effective, both in the number and size of fruits produced from treated flowers [of tomato var. Globe], and in the extensive development of gelatinous pulp within the locules. Equally pronounced effects were obtained when the chemical was employed to supplement pollen of low viability; (in this case also) the set and quality of the fruit were greatly improved. The chemical used in a lanolin emulsion was frequently superior to the paste form, except for the fact that it resulted in considerable blossom-end rot. Details of the technique of application need to be improved, but very pronounced effectiveness of the material is unquestioned. [Author's summary.]

173. LINK, G. K. K., AND EGGERS, V. 635.64 : 632.314 : 581.192

Hyperauxiny in crown gall of tomato.

Bot. Gaz., 1941, **103** : 87-106, bibl. 33.

The paper reports the results of *Avena* coleoptile tests of extracts of non-inoculated hypocotyls of tomato and hypocotyls of the same age and cultural conditions but bearing large crown galls produced by inoculation with pure cultures of *Phytophthora tumefaciens*. The first part of the paper is devoted to a comparison of extractants and extractant procedures; the second to comparative assays of non-inoculated and inoculated organs. The significance of the finding that the growth disturbance known as crown gall is associated with disturbances in auxin relations (dysauxiny) is discussed with reference to the hypothesis that auxins play rôles in normal and in healthy growth of plants and to the causal complex of gall development.

174. RIKER, A. J., HENRY, B., AND DUGGAR, B. M. 632.314 : 577.15.04 : 635.64

Growth substance in crown gall as related to time after inoculation, critical temperature, and diffusion.

J. agric. Res., 1941, **63** : 395-405, bibl. 18.

The experiments of certain other investigators, on which suggestions or claims were made that substances like heteroauxin were responsible for the pathogenicity of crown gall bacteria, were repeated (using the tomato as a host). Although their results have been generally confirmed their conclusions appear unjustified. So far as the authors of this paper are aware the crown gall bacteria are pathogenic independently of auxin production. [From authors' summary.]

175. JANES, B. E. 577.15.04 : 635.64 : 581.163

Some chemical differences between artificially produced parthenocarpic fruits and normal seeded fruits of tomato.

Amer. J. Bot., 1941, **28** : 639-46, bibl. 21.

Fruits of the John Baer tomato produced parthenocarpically by indolebutyric acid, indoleacetic acid and pollen of *Lycopersicum peruvianum* were compared with normal seeded fruits. Indoleacetic acid produced very small fruits, indolebutyric and pollen of *L. peruvianum* fruits only slightly smaller than normal seeded fruits. The titratable acidity was in total amount about the same but, whereas in the parthenocarpic fruits it was fairly evenly distributed, in the seeded fruits there was less in the outer wall and more in the locular region. Percentage of

starch was greater in the parthenocarpic fruits except for the very ripe fruits, where both kinds showed a very low starch content. In the early stages the percentage of sugar was about the same, but it increased much more rapidly throughout development in the parthenocarpic fruits. The differences in starch and sugar were reflected in the dry weight and soluble solids. It is evident that the developing seeds exert a profound influence on the chemical composition of the fruit.

176. (DAWSON, R. F.) 633.71-1.541.11/12 : 635.64

Nicotine accumulation in reciprocal grafts of tomato and tobacco.

Nature, 1941, 148 : 697.

A brief summary of a paper by R. F. Dawson read at the Autumn Meeting of the U.S. National Academy of Sciences, October, 1941. Tobacco scions grown on tomato stocks showed no appreciable amounts of nicotine accumulated in the tobacco leaves and stems and the nicotine originally present in the scion did not move into the new growth of the scion. Tomato scions on tobacco stocks accumulated nicotine in appreciable quantities in the stems and fruit and large quantities of the alkaloid accumulated in the leaf. From these and other data it is considered that the presence of nicotine in tobacco leaves is due to (a) the synthesis of the alkaloid in the tobacco roots ; (b) the translocation of the fully formed base (and not its precursor) to the leaves by way of the xylem, and (c) the continued accumulation of this nicotine in the leaves.

177. LYON, C. B. 635.64 : 631.811.5

Responses of two species of tomatoes and the F_1 generation to sodium sulphate as a nutrient medium.

Bot. Gaz., 1941, 103 : 107-21, bibl. 22.

At the U.S. Regional Salinity Laboratory, Riverside, California, tomato varieties of Johannisfeuer and Red Currant and their F_1 generation were submitted to four treatments, providing four concentrations of Na_2SO_4 ranging from 4.6 to 124.6 milliequivalents of sulphate ion per litre of nutrient solution. All three strains were affected by high concentrations of sodium sulphate though Red Currant was less affected than the other two. The behaviour of the hybrid more closely resembled that of the Johannisfeuer than that of the Red Currant parent. The effects in various degrees of increased concentration of sodium sulphate on all three strains were (1) depression of growth, (2) reduction of dry weight of vines and (3) of roots, (4) reduction in total fresh weight of immature fruits produced by plants 87 days old, (5) increased density of ripe fruits, (6) reduction in mean weight of each ripe fruit, (7) reduced stem diameter. In the case of Red Currant the results obtained in (3), (4) and (6) were not significant.

178. THOMAS, W., AND MACK, W. B. 635.64 : 631.811.9 : 631.4

Foliar diagnosis in relation to soil heterogeneity.

Soil Sci., 1941, 52 : 455-68, bibl. 15.

In a differentially fertilized greenhouse experiment with tomatoes, the nutritional factors producing differences in yields between similarly fertilized pairs of plots have been examined by the method of foliar diagnosis. Examination of the relative percentage difference in yields between pairs of similarly treated plots indicated the absence of any uniform soil factor. It was found that well-rotted horse manure tended to reduce the effect of the original soil differences. The effect of a fertilizer on yields may be the result of its effect on the intensity of nutrition or on the physiological relations among the elements as expressed by the equilibrium among them or on both values simultaneously. The results in respect to these values are summarized. The position of foliar diagnosis investigations in relation to the micro-nutrient elements is defined. [From authors' summary.]

179. WATANABE, S., AND OTHERS. 635.64 : 631.8

Trials of tomato fertilizers. [Japanese.]

J. hort. Ass. Japan, 1941, 12 : 35-54, bibl. 6.

The soil was loam with volcanic ash. With the addition of 167-204 lb. per acre of N, P_2O_5 and K_2O fertilizers yields of 50-58 lb. of tomatoes per plant were obtained. Time of application had little effect on actual amount of yield, but early and large applications resulted in the

production of large fruits at the beginning of cropping, while later applications gave the same result later in the crop. Nitrogen proved most essential, followed by phosphate with potash little needed on this soil. Attempts to determine whether nitrogen affected fruit drop seemed to indicate that it had little effect. Growth of fruits reacted very favourably to phosphates.

180. DAY, D. 577.16 : 635.64 : 581.144.2
Vitamin B₆ [pyridoxine] and growth of excised tomato roots in agar culture.
Science, 1941, **94** : 468-9, bibl. 7.
 Pyridoxine was of distinct benefit.

RICHARDSON, L. T. 635.64 : 632.411
A *Phytophthora* tomato disease new to Ontario.
Canad. J. Res., 1941, **19**, Sec. C, pp. 446-83, bibl. 30.
P. parasitica.

181. CHITWOOD, B. G. 631.462 : 632.651.3
Soil treatments with volatile liquids for control of nematodes.
Phytopathology, 1941, **31** : 818-24, bibl. 4.

Chloropicrin, ethylene chloride and mixtures of the two were used effectively against eelworm (*Ditylenchus dipsaci*) infesting daffodil in the field in sandy loam and against the root knot nematode (*Heterodera marioni*) in a greenhouse and infesting tomatoes out of doors on sandy loam. Injurious soil fungi were also destroyed. The mixture of chloropicrin 1.5 c.c. and ethylene chloride 8.5 c.c. gave the best results in the greenhouse and on tomatoes. For narcissus eelworm 10 c.c. injections of ethylene chloride to a depth of 6-8 inches in rows 9 inches apart and holes 10.5 inches apart were most effective. Other treatments were efficient but much more expensive.

182. MINISTRY OF AGRICULTURE, LONDON. 631.544 : 632.651.3
Root knot eelworm in glasshouses [*Heterodera marionii*].
Advis. Leaflet. Minist. Agric. Lond. **307**, 1941, pp. 4.

183. ORMAN, A. C. 635.65 + 664.84.65
Beans for canning.
Agric. Gaz. N.S.W., 1942, **52** : 560-4.

In Australia the white navy pea bean, Little Navy, is used almost exclusively for canning. Optimum conditions are a frost-free period of about 120 days, a relatively mild growing season with simple and well-distributed rainfall and a dry harvesting period. Many soil types are used provided they are well drained and not liable to flooding. Heavy clays are the least suitable because of the likelihood of the seed being stained in wet weather, especially at harvest. Sowing is done with a grain drill or the 2-row maize planter using 30 lb. of seed to the acre. Fertilizers, 2½ cwt. superphosphate per acre and in some districts ½ cwt. of sulphate of ammonia, have given good results, though official trials have not been carried out. After-cultivation may consist of harrowing before germination to destroy young weeds and break the surface crust and occasional very shallow inter-row cultivations. Harvesting must be correctly done to provide good quality samples. The three methods are hand pulling, scything at or below ground level, or cutting just below the surface with a special double row bean cutter (illustrated and described) which can be home-made at low cost and will cut 12-14 acres per day. After cutting the beans are forked into small heaps to dry. After drying for a few days they are ready for threshing or stacking. A well-cured rather than a brittle bean, which may crack on threshing, is desired.

184. ARNOLD, H. C. 635.655
Soya beans.
Rhod. agric. J., 1941, **38** : 475-86.

Trials of yellow-seeded and Jubiltan strains, the latter, which are however only suitable for use as cattle food, being more economical to raise.

185. RESÜHR, B. 635.655 : 632.19

Über die Bedeutung konstitutioneller Mängel für das Auftreten von Keimlings-schäden bei *Soja hispida* Moench. II.* Beitr. (The importance of constitutional deficiencies for the occurrence of seedling loss in soya bean, II.) *Z. PflKrankh.*, 1941, 51: 162-92.

Further experiments show that soaking the seed (Vorquellung) led to considerably increased losses in soya bean seedlings.

186. GLASSCOCK, H. H. 635.656 : 632.19

Varietal susceptibility of peas to marsh spot.

Ann. appl. Biol., 1941, 28 : 316-24, bibl. 13.

From an analysis of plot trials at Wye in 1933 and '34 and with the aid of descriptions of varietal characteristics provided by the firm supplying the seed it is shown that marsh spot affects late-maturing, large-seeded peas more severely than early-maturing varieties with small seeds. Roundness of seed was also associated with earliness of maturity and resistance to disease.

187. FARAM, C. H. C. 633.79

"The hop situation."

J. Inst. Brewing, 1942, 48 : 13-5.

An account of the present hop situation in England and its difficult problems.

188. LEEK, F. H. 633.79

The 1941 hop crop.

J. Inst. Brewing, 1942, 48 : 15-6.

A brief review of the past hop season in England.

189. NELSON, N. T. 633.71

Tobacco research in Canada.

Emp. J. exp. Agric., 1941, 9 : 265-76, bibl. 30.

Certain of the tobacco investigations in Canada are conducted by the Tobacco Division of the Experimental Farms Service at Ottawa in co-operation with the other Science Service Divisions. Soil investigations are being carried out in co-operation with the Chemistry Department of the Ontario Agricultural College at Guelph. In Quebec L'Assomption Station gives special attention to the cigar, aromatic pipe and flue-cured types of the district. At Harrow in Western Ontario the problems of burley and dark tobacco are being investigated. The Sub-station at Delhi, Ont., is concerned exclusively with flue-cured tobacco. Summerland, B.C., looks after tobacco problems of British Columbia. Some of the more outstanding results of recent years are briefly indicated in the present paper. They concern fertilizers for all kinds of tobacco, tobacco soils and the availability of sufficient nutrients, physiological investigations into the mineral absorption and the carbohydrate and nitrogen metabolism of the tobacco plant, nutrition studies in sand culture, the stimulation of seedlings by the use of growth substances, genetical and varietal improvements. The economic progress of the industry in the past 10-15 years has been immense. Thus, the use of home-grown tobacco for cigarettes rose from 41.1% in 1930 to 88.3% in 1940 with similar increase in its use for cigars, pipe tobacco and snuff. Exports of leaf tobacco rose from 6.7 million pounds in 1931 to 32.2 million pounds in 1939.

190. BROWN, D. D. 633.71-1.531

Tobacco culture in Southern Rhodesia. Seed-beds.

Rhod. agric. J., 1941, 38 : 487-501.

Detailed instructions are given on the preparation and care of tobacco seed-beds and raising of young seedlings under S. Rhodesian conditions.

191. HENDERSON, R. G. 633.71-1.8

Treatment of tobacco plant bed soil with nitrogenous fertilizers.

Agric. News Letter (Du Pont), 1941, 9 : 72-8, bibl. 2.

Experiments carried out by the author at the Agricultural Experiment Station, Virginia, indicate that heavy applications of urea or calcium cyanamide to soil to be used for seedling tobacco will

* For 1st report see *Ibidem*, 1941, 51 : 65, *H.A.*, 11 : 1276.

give effective control of weeds under certain conditions and would possibly prove toxic to the fungus causing black root rot (*Thielaviopsis basicola*).

192. SPENCER, E. L. 633.71-2.8
Influence of nitrogen supply on the rate of multiplication of tobacco-mosaic virus.
Plant Physiol., 1941, 16 : 663-75, bibl. 14.

The experimental evidence is interpreted as supporting the view that the increased virus activity associated with an increased nitrogen supply is due primarily to an increase in the rate of virus multiplication in the case of the high-nitrogen plants and only slightly, if at all, to the partial inactivation of the virus entity in the case of the low-nitrogen plants. [From author's summary.]

193. JACK, R. W. 633.71-2.651.3
Cultural measures for control of root-knot eelworm with special reference to tobacco.
Rhod. agric. J., 1941, 38 : 546-59, bibl. 16.

In the control of eelworm on tobacco it is important to prevent the infestation of seed beds from which the land may subsequently become infested when the seedlings are transplanted. Risk of seed bed infestation is reduced by:—(1) Use of newly broken land. (2) Avoidance of old garden sites and their immediate vicinity, sites from which drainage or flood water runs from cultivated ground and low lying sites generally. (3) Frequent change of site. (4) Watering from a bore hole or well rather than from a stream or pool. Eelworm cannot be eradicated from cultivated lands and chemical control is usually uneconomic. Palliative methods which may check increase are suggested. All living plants should be removed immediately after harvest and the land ploughed several times in the dry season to secure maximum drying out. Exposure to sunlight destroys eggs and all other stages in the top inch of soil in a few hours. Other methods based on exposure are also discussed.

194. KASSANIS, B., AND SHEFFIELD, F. M. L. 633.71-2.8
Variations in the cytoplasmic inclusions induced by three strains of tobacco mosaic virus.
Ann. appl. Biol., 1941, 28 : 360-7, bibl. 17.

MCCLEAN, A. P. D. 632.8 : 633.71 + 635.9
Some leaf curl diseases in South Africa. (1) Leaf curl disease of tobacco. (2) A new "Petunia" strain of leaf curl and a note on the occurrence of a leaf curl disease of hollyhock.
Sci. Bull. Dep. Agric. S. Afr. 225 (*Botany and Plant Pathology Series* 2), 1940, pp. 1-60, bibl. 21 and pp. 63-8.

BREMER, H., AND OTHERS. 632.19 : 635.25 + 635.41
Beobachtungen quantitativer Art über das Auftreten von Schäden an Gemüsepflanzen. Schäden an Zwiebeln und Spinat. (Reasons of loss sustained in vegetable crops. Losses in onions and spinach.)
Z. PflKrankh., 1941, 51 : 278-93.

FLOWER GROWING.

195. WILDE, E. I., AND CULBERT, J. R. 635.931
Trials of annual flowers 1940.
Bull. Pa agric. Exp. Stat. 402, 1941, pp. 38.

Results are given of growth trials with annual flowers, chiefly zinnias, petunias and marigolds together with many others in smaller numbers.

196. LEPIK, E. 635.939.516 : 632.41
Spread of snapdragon rust in Europe.
Int. Rev. Agric., Rome, 1941, 32 : 93T.

A brief note attributing the origin of the disease to North America and describing its rapid spread throughout Europe.

197. LAURIE, A. 635.966

Studies of the keeping quality of cut flowers.

Agric. News Letter (Du Pont), 1941, 9: 22-5, bibl. 4.

The results of work on factors influencing the keeping qualities of cut flowers, carried out since 1934 at Ohio State University, are summarized. The use of copper containers or copper wire in glass containers slightly prolonged the keeping qualities with some varieties, gave no results with others and reduced the period in one variety only, carnations. Cutting stems under water benefited plants having stems with large conducting vessels, e.g. sweet pea. A common idea is that plants keep longer in deep water. In these experiments flowers, if affected at all, kept 2 or 3 days longer in shallow water because less stem surface was exposed to bacterial decomposition in the water. For a similar reason stems sealed along the sides absorbed more water and lasted longer than unsealed stems. Respiratory rate of flowers seems definitely related to longevity and is inversely proportioned to the keeping rate. Attempts to lower the respiration rate by chemical means were made and are briefly discussed. Several chemical formulae are given which have proved satisfactory. The addition of vitamin B₁ was useless.

198. BRIERLEY, P. 635.944 : 632.8

Current-season development of virus symptoms in tulips.

Phytopathology, 1941, 31: 838-43, bibl. 12.

The paper presents the first evidence that when used at an early stage of plant growth the method of inoculation by leaf rubbing with the aid of carborundum powder is effective in yielding current-season symptoms with viruses transmissible to tulips.

199. WELTON, F. A., AND CARROLL, J. C. 635.964 : 632.51

Lawn experiments.

Bull. Ohio agric. Exp. Stat. 613, 1940, pp. 43, bibl. 15.

WELTON, F. A., AND CARROLL, J. C.

Control of lawn weeds and the renovation of lawns.

Bull. Ohio agric. Exp. Stat. 619, 1941, pp. 85, bibl. 13.

TYSON, J.

Growing beautiful lawns.

Ext. Bull. Mich. St. Coll. 224, 1941, pp. 14.

The first of these bulletins instructs on the making and general maintenance of lawns under Ohio conditions, the second on the control of weeds. Chloropicrin gas is found particularly useful for the destruction of weed seeds in soil or compost. It does not adversely affect the growth of grasses. Cyanamide as a top dressing also proves effective on lawns. Sinox, a proprietary substance, actually sodium dinitro naphthanate, also shows promise. The third author deals with the making and care of lawns under Michigan conditions. This bulletin is of rather a more popular type than the other two.

200. PAPE, H. 635.938.46 : 632.654.2

Die Milbe *Avrosia translucens* Nietner als Erreger einer Korksuchtartigen Erkrankung der Elatior-Begonien. (The mite, *A. translucens* causes excessive cork formation in Elatior begonias.)

Zbl. Bakt., 1941, 103, 80-90.

NELSON, R. H., AND CASSIL, C. C.

635.944

Adsorption of mercuric chloride from solutions by gladiolus corms.

Circ. U.S. Dep. Agric. 610, 1941, pp. 10, bibl. 12.

CITRUS AND SUB-TROPICALS.

201. NANKING UNIVERSITY. 634.3

Continuation of citrus improvement work.

Agriculture and Forestry Notes, 1941, No. 11, pp. 5-6.

In 1941, the 4th year of its citrus improvement work, the Department of Horticulture included work on (1) selection from previous trials for distribution locally, (2) rooting and crown formation of specific oranges and tangerines, (3) cross pollination of sweet orange with pollen from pummelo, tangerine and sweet orange, (4) a continuation of storage studies including observation

of the use of cheap ventilated pits. The Division of Entomology is studying the overwintering of the citrus fruit fly, two citrus leaf miners and the citrus gall mite and the effectiveness of baits, burying infested fruit and traps for reducing fly population. The Plant Pathology Division is studying the control of storage diseases.

202. BURMA, DEPARTMENT OF AGRICULTURE.

634.31

Orange.

Markets Section Survey Dep. Agric. Burma 7, 1941, pp. 42, As. 12 or 1s. 1d.

This interesting report deals with the following details of oranges and their marketing in Burma. Types of orange. Areas devoted to production. Demand. Packing. Assembling. Transporting to market. Distribution. Storage. Standardization and grading. Prices. The report remains as submitted in 1936 but additional tables have been added relating to exports, imports, etc., since then.

203. ZORIN, F. M.

634.3 : 575:257

Seed progeny of the vegetative hybrid of the mandarin, Siva-Mikan, and citrangequat. [Russian.]

Vernalisation, 1940, No. 5 (32), pp. 128-9.

The following experiment was carried out at the Experimental Station of Subtropical and Southern Fruit Crops at Sochi. A bud from the mandarin, Siva-Mikan, having a small, early-ripening fruit, was grafted on to a branch of a citrangequat, a hybrid product of orange, trifoliate orange and kumquat. When the shoot which grew from the bud was about 25 cm. long, its tip was grafted into another branch above it. Both ends of the shoot were thus grafted into different branches of the same stock plant. After two years the shoot formed buds, the leaves from which were removed, as they appeared, and the flowers protected by parchment to ensure them being fertilized only by their own pollen. The author mentions in passing that the flowering periods of the stock and scion do not coincide and that the pollen of citrangequat has so far proved to be ineffective, attempts to obtain hybrids by dusting it on lemon flowers having never yet succeeded. Though deprived of its leaves, the scion produced 10 fully matured fruits. These fruits had been wholly nourished from the stock and had acquired some of the outward characteristics of its fruit. The 10 fruits produced 3 seeds which were sown in winter in pots placed in a warm glasshouse. Only one seed germinated. At first the seedling plant showed none of the morphological characteristics of a citrangequat but in the second half of July its leaves began to assume hem. Indeed, it came to have a closer resemblance to the citrangequat than to the mandarin.

204. MARQUES DE ALMEIDA, C. R.

634.31-1.535

Propagação vegetativa da laranjeira azêda. (Vegetative propagation of the sour orange.) [English summary 3½ pp.]

Inst. sup. Agron. Lisboa, 1940, 11 : 19-48, bibl. 63.

A succession of cuttings of sour orange, herbaceous, half ripened and woody, were treated at intervals from April to July by immersion of the stems in β -indolylacetic acid 1 : 10,000 or 1 : 20,000 or α -naphthalene acetic acid at similar concentrations for 24 hours and subsequently planted in a greenhouse. Herbaceous cuttings all failed but the others rooted in fair numbers, the percentage increasing as the weather grew warmer. Attempts to maintain a uniform temperature common to all the experiments failed and the author suggests that the increasing success must have been influenced by the heat. Of the two concentrations used 1 : 10,000 was the most effective with both auxins and β -indolylacetic was slightly more efficient than α -naphthalene acetic acid. The paper is not a mere record of experiments but discusses fairly fully the physiological problems involved. The opinions expressed are supported by an extensive bibliography.

205. MURRAY, D. B.

634.3-1.541.11

Citrus rootstock trials in Southern Nigeria.

Trop. Agriculture, Trin., 1941, 18 : 197-9.

At Agege and at Moor Plantation in Southern Nigeria citrus rootstock trials were laid out in 1932 on light and medium light, well-drained sandy soil, using stocks of sour orange, sweet orange, acid lime, rough lemon, grapefruit, shaddock and tangerine, all raised from seed but not always

from the same stock parent. The grapefruit and orange scions were local selections of good repute. Sour orange gave the highest yields, though sweet orange (seedlings from imported material) ran it close and is easier to rear and bud, being unaffected by the scab disease which damaged the sour orange even under shade. Besides, if the scion should die back, the native farmer would still have a sweet orange tree rather than a useless sour orange. On the other hand imported sweet orange often succumbs to gummosis at a comparatively early age. The native green-skinned, sweet orange seems less susceptible and is to be tried as a stock against the sour orange, which last should be used in new plantings until further information is available.

206. HODGSON, R. W., AND EGGERS, E. R. 634.31-1.55
Alternate bearing tendency in Valencia orange.
Calif. Citrogy., 1941, 27: 4, 18, bibl. 4.

The tendency towards alternate bearing by Valencia oranges has been studied in California. The results seem to indicate a depressing effect of a large crop on the amount of fruit in the succeeding crop, which effect increases with the length of time the crop remains on the tree. The only comparable published work is that of West and Barnard* in Australia supporting the conclusions of the authors with the exception that they report the production of large fruit of inferior quality in the light crop years and small fruit in the heavy crop years, whereas no consistent relationship between amount of crop and fruit size was discovered in the California experiments. A more technical report of the work in California appeared in *Proc. Amer. Soc. hort. Sci. for 1940*, 38: 196-201; *H.A.*, 11: 854.

207. FINCH, A. H. 634.3-1.8
Recent developments in citrus fertilization and orchard management in Arizona.
Mim. Rep. Ariz. agric. Exp. Stat. 41, 1941, pp. 13, bibl. 13.

This report is of an eminently practical nature consisting of questions and answers on practical citrus cultivation in Arizona. The main points brought out are as follows:—Under Arizona conditions there is little, if any, need for phosphate and potassic fertilizers. Trees should be kept deep green in the winter and spring. A nitrogenous fertilizer applied between 1 December and 1 March should achieve this. If the trees become slightly yellowish in the summer and autumn fruit quality will tend to improve. Summer cover crops are useful to bring this about. Keeping the soil moist in the winter contributes to better yields and in the summer to better fruit quality. Winter weeds do not matter provided enough nitrogen is given. Cultivate only when necessary. If farmyard manure is used it should be applied in the late summer.

208. HILGEMAN, R. H. 634.323-1.84
Nitrogen uptake by grapefruit trees in the Salt River Valley [Ariz.].
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 119-24, bibl. 4.

These studies were made in two groves which had not received fertilizer for some years. They concerned the time of application and the quickness of response of grapefruit trees of different age to different nitrogenous fertilizers. Nitrogen was taken up most rapidly from calcium nitrate, followed by urea, ammonium sulphate and farmyard manure in that order. The time of application producing the highest nitrogen in the new leaves was February for calcium nitrate, December for urea and ammonium sulphate and August for the manure.

209. REEVE, J. O., AND FURR, J. R. 634.3-1.432
Evaporation from a shallow black pan evaporimeter as an index of soil moisture extraction by mature citrus trees.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 125-32, bibl. 6.

The aim of the Californian trials described here was to determine whether evaporation from the shallow black pan evaporimeter gives a sufficiently reliable means of estimating soil moisture extraction by citrus to be useful in managing irrigation plots and in controlling moisture under orchard conditions by the ordinary grower. The technique is described and the results are discussed. The application of the results is difficult owing to the fact that relatively few orchards have facilities for getting the soil moisture data essential for calculating the evaporation

* West, F. S., and Barnard, C. The alternation of heavy and light crops in the Valencia orange. *J. Coun. sci. industr. Res. Aust.*, 1935, 8: 93-100, *H.A.*, 5: 437 and *Ibidem*, 1937, 10: 215-24, *H.A.*, 8: 174.

co-efficient accurately and this is essential for the use of the method. Trials are being conducted by a few growers.

210. RICHARDS, L. A., AND HUBERTY, M. R. 634.31-1.432

Moisture studies under citrus using tensiometers.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 73-9, bibl. 3.

A year's record has been obtained on tensiometers at eight depths down to 15 feet under two 11-year-old [navel] orange trees [on sweet stock], one being irrigated twice as often as the other. The data provide information on the rate and depth of moisture penetration, on moisture storage and rate of root extraction at various depths, and on root zone leaching. [Authors' summary.]

211. CAMERON, S. H., AND HODGSON, R. W. 634.3-1.542

Effect of severity of pruning on top regeneration in citrus trees.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 67-72.

A study at the Los Angeles Station, California, since 1938 of top regeneration following light, medium and heavy pruning of 23 10-year-old citrus trees representing Valencia and Washington Navel orange, Marsh grapefruit and Eureka lemon leads the authors to the following conclusions: 1. That rate of top regeneration and resumption of fruiting during the first two years is inversely proportioned to the severity of pruning. Lightly pruned trees make more new growth the first year than they do the second, but severely pruned trees make more new growth the second year than they do the first. 2. That lightly pruned trees re-establish a full complement of leaves during the first year after pruning, but that heavily pruned trees require two or more years to produce leaves equal in weight to those removed by the pruning. 3. That under conditions where tree growth is uniform, an equally accurate calculation of the rate of top regeneration can be made on the basis of fresh weight of the above ground parts of the tree, or of the branches and leaves only, as upon the total weight of the tree.

212. MARTIN, W. E. 634.323

An evaluation of some of the factors affecting quality of grapefruit in commercial groves of the Salt River Valley [Ariz.].

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 59-66, bibl. 4.

Quality of grapefruit in the Salt River Valley as shown in marketability and the proportion of high grade to low grade fruit is affected:—*By production.* Quality improves as yield increases up to 4 boxes per tree and then does not change. *By summer cover crops.* These make for rather better quality than clean cultivation in the summer. *By water supply.* A supply of less than 3 acre-feet per acre makes for somewhat poorer quality than larger amounts. The individual effects upon quality are slight but in the aggregate may be considerable.

213. WAHLBERG, H. E. 634.3-2.183

Windbreaks for orchard protection.

Calif. Citogr., 1941, 26: 359, 372-3.

The need for windbreaks as part of the orchard enterprise in S. California is stressed. Windbreaks should form part of a unified plan throughout the district for maximum effect rather than be the piece-meal efforts of isolated holdings. The relation between height and windbreak is about 1:4, i.e. a 100 ft. high windbreak will protect 400 ft. of orchard or 13-15 tree rows. For example, a square 10-acre orchard would be almost perfectly protected by a central windbreak situated 330 feet from the outside windbreak. A grille system of windbreak planting is described which allows uninterrupted movement of farm machines through the orchard. The eucalyptus and Monterey cypress will probably be superseded as windbreak trees by the Arizona cypress and possibly the Forbes cypress, indigenous to Orange county. There should be ample room between the windbreak and the property line to allow of good root development. In the more exposed orchard areas a windbreak acreage of 1 in 10 is justified. Instructions are given for the upkeep of the windbreak and there are illustrations and brief descriptions of lattice windbreaks and of perambulating circular saw root and branch cutters for trimming purposes. The root cutter will cut lateral roots to a depth of 5 feet.

214. PARKER, E. R., AND SOUTHWICK, R. W. 634.3-2.19 : 546.711

Manganese deficiency in citrus.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 51-8, bibl. 8.

Manganese deficiency was found to be widespread in California. Symptoms, which differ from those of zinc deficiency, are generally mild and occur both on highly productive and decadent trees. Severe deficiency symptoms were in some areas associated with early decline of lemon trees. Sprays, including manganese sulphate and soda ash 10-5-100 and 4-2-100 respectively, proved successful in some cases. In others, when followed by fumigation, they resulted in burning of young orange and lemon leaves.

215. LEVITT, E. C., AND NICHOLSON, R. I. 634.3-2.19 : 546.711

Severe manganese deficiency of citrus.

Agric. Gaz. N.S.W., 1941, 52 : 477-9, bibl. 1.

The paper deals with extreme leaf and twig symptoms and the treatment of a single tree of Valencia orange. Many of the symptoms were in agreement with those described by Haas* from citrus grown in manganese deficient solution, but there was in the present case a complete absence of gumming and the leaves curled dorsally, moreover a further symptom was the raising of the veins of the dorsal surface of the leaf. The tree recovered after manganese sulphate-lime spray applications. Manganese determinations made from the untreated and treated halves of the tree on growth produced subsequent to the spray applications gave the results, unsprayed portion 3.2 p.p.m. manganese, sprayed portion 81.9 p.p.m. manganese.

216. KLOTZ, L. J. 634.3-2.4

Brown rot of citrus fruit. Important factors in its control in orchard and packing house.

Calif. Citrogr., 1941, 27 : 6, 23.

Various treatments are discussed, choice depending in the case of orchards on the spraying programme in use. For the packing house immersion treatments either in hot water at 117°-120° F. or in hot soda ash solutions. From the point of view of brown rot control the chemicals are unnecessary, the heat alone being sufficient.

217. AVERNA SACCÁ, R. 634.3-2.42

***Nectria cancri* (Butg.) f. *aurantii* Averna.**

Rev. Agric. S. Paulo, 1941, 16 : 150-60.

Two new forms of *Nectria*, *N. cancri* (Butg.) f. *aurantii* Averna and *Nectria* sp. attacking the above ground parts and the superficial roots of oranges and lemons respectively in Brazil are described and a spray treatment is suggested.

218. PICKLES, A. 634.3-2.6/7

Observations on some of the less familiar pests of citrus in Trinidad.

Proc. agric. Soc. Trin. Tob., 1941, 41 : 395, 397, 399.

The articles deal with citrus pests which have been little noticed in literature but are of occasional local or seasonal severity. All are illustrated. That discussed in the present article is the citrus weevil borer (*Cratosomus punctulatus*). The insect tunnels in the wood of small branches which it kills; often the greater part of a tree may be affected. Dead or dying branches must be removed (as a routine, whatever the cause), cut into small pieces to find, if possible, the beetle or its larvae, and destroyed. Neglect to do this over long periods may result in the beetle reaching the roots and killing the tree.

219. HAYWARD, K. J. 632.752 : 634.3

Las cochinillas de los citricos tucumanos y su control. (Scale insects in Tucuman and their control.)

Bol. Estac. exp. agric. Tucuman 32, 1941, pp. 29, bibl. 8.

Some fifteen species of scale insect found in Tucuman, Argentine, are described with biological notes, the most harmful being dealt with at some length. The various methods of control are discussed.

* Hilgardia, 1932, 7 : 181-206, H.A., 3 : 218.

220. ALLISON, J. R. 634.3-2.752

Spraying citrus trees.

Calif. Citrogr., 1941, 27: 34.

Experimental evidence is brought to show that the difference in control efficiency in spraying citrus trees for scale when wet or when dry is insignificant. Thus much valuable time is wasted through the current practice of spraying only when the trees are dry.

221. TURRY, H. B. 633.492

Sweet potatoes.

Fmg S. Afr., 1941, 16: 268, 296.

Some useful notes are given on the cultivation of sweet potatoes on a large scale in South Africa, light sandy or loamy soils which have been previously ploughed and cultivated for other crops being preferred. Propagation is by slips or cuttings. Yields vary from 12 to 16 tons per morgen (2½ acres).

222. TERRY, H. B. 633.84

Capsicums: bell peppers, sweet peppers or pimiento peppers.

Fmg S. Afr., 1941, 16: 327-8, bibl. 3.

The cultivation of capsicums of various kinds under S. African conditions is described. Several culinary recipes are given.

223. COCHRAN, H. L. 633.842

Better methods of pimiento production.

Bull. Ga Exp. Stat. 218, 1941, pp. 41, bibl. 12.

Georgia, although having the largest acreage in the U.S.A. under pimiento, is second to California in production. The low average yield would appear to be due mainly to diseases. This bulletin, which gives a full account of recommended methods for growing in hot beds, cold frames or open field in Georgia with adequate notes of pest and diseases and their control, should be of considerable help in raising yields.

224. LAURIE, M. V., AND SEN GUPTA, J. N. 633.85

Notes on cultivation of tung-oil tree (*Aleurites* spp.) in India.

Ind. For. Rec. Silviculture, 1941, 4: 133-59, bibl. 22.

A note is given of the history and economic importance of tung oil, now an indispensable raw material in paint and varnish manufacture, though other oils such as perilla oil, oiticica oil and po-yok oil are becoming successful competitors in the world's markets. The commercial species, *A. montana* and *A. fordii*, are described and their distinguishing characters are illustrated. Propagation and cultivation techniques are treated in some detail but contain nothing that has not already been published in the fast growing literature. Experiments at the Indian Lac Research Institute, Ranchi, from 1928 indicate that germination from local seeds is as good as from imported seeds and that the oil content of native fruits is comparable in quality to that produced in other countries. In view of the competition mentioned it would be unwise to embark on large-scale plantations in India. The tree is well suited for planting by single trees or in small numbers along field boundaries and waste land and the desire is to develop the production of tung oil as a village industry. Suggestions based on experiments in other countries are made for the manuring of the young trees. The most suitable soil appears to be one slightly acidic, moist but well drained and without an excessive quantity of lime phosphate. A rainfall of 50-70 inches is desirable. *Aleurites fordii* needs a climate less tropical than *A. montana* while *A. montana* prefers the heavier rainfall. The trees have a useful life of about 30 years and commercial yield may be looked for where cultivation succeeds from the 5th year.

225. ANON. 633.85

Tung oil: trials in Ceylon.

Trop. Agriculturist, 1941, 97: 87-94.

The history of the attempts to cultivate tung (*Aleurites* spp.) in Ceylon is surveyed and brief details are given of cultivation methods. *A. fordii* is unsuited to the climate, while *A. montana* which grows well produces too many staminate flowers. This, however, could be remedied by budding. The oil produced from *A. montana* in Ceylon is reported by the Imperial Institute, London, to conform to the general standard of *A. montana* oil.

226. McCANN, L. P., COOK, W. S., AND CAMPBELL, C. R. 633.85
Factors affecting time of initiation and rate of development of pistillate flowers of the tung tree.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 157-60, bibl. 4.

Trials show that the time of tung flowering in spring is not affected much by environmental conditions the previous summer. Hence the problem of obtaining late-blooming trees to escape late frosts cannot be approached from a study of flower bud development prior to dormancy.

227. BROWN, R. T., AND FISHER, E. 633.85 : 581.145.1
Period of stigma receptivity in flowers of the tung tree.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 164-6.

Preliminary studies show that under the conditions existing at Cairo, Georgia, in April 1940, pistillate flowers of *Aleurites fordii* were receptive from the time of opening for 9 days.

228. FERNHOLZ, D. L., AND POTTER, G. F. 633.85-2.111
Preliminary experiments on the resistance of the tung tree to low temperature.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 167-72, bibl. 1.

Artificial freezing tests in Louisiana show:—(1) That the tissues of the tung tree (*A. fordii*) steadily increase in cold resistance from leaf fall to mid-winter. (2) That there are inherent differences in cold resistance as between the seedling progenies of different trees. (3) That fertilizers may possibly affect cold resistance. The experiments are being continued.

229. MERRILL, S., JR., AND OTHERS. 633.85
Effect of planting date on germination of tung nuts in the nursery.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 153-6.

Early spring is best in Mississippi.

KILBY, W. W., AND PARKER, M. D. 633.85 : 581.14

The growth period in shoots and fruits of mature tung trees.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 161-3.

230. ALDRICH, W. W., AND YOUNG, T. R., JR. 634.62 : 581.192
Carbohydrate changes in the date palm during the summer.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 110-8, bibl. 8.

An examination of the carbohydrate reserves of the date palm at different times of the year indicated that, when the removal of the lower leaves is necessary to reduce fruit scarring and allow bagging of bunches, this removal should be not in the autumn but as late in the spring as possible.

231. BOYDEN, B. L. 634.62-2.752
Eradication of the parlatoria date scale in the United States.

Misc. Publ. U.S. Dep. Agric. 433, 1941, pp. 62, bibl. 15.

Offshoots of date palms first introduced from the Old World in 1890 were infested with the parlatoria scale (*Parlatoria blanchardi*). The progress of eradication work from 1914 to 1936 is described. There are indications that it has been wholly successful.

232. HIGGINS, B. B., AND OTHERS. 634.58

I. Peanut breeding and characteristics of some new strains.

II. Thiamin chloride and nicotinic acid content of peanuts and peanut products.

III. Peptization of peanut proteins.

Bull. Ga Exp. Stat. 213, 1941, pp. 18, bibl. 13.

I. Surveys of more than 600 hybrid peanut strains show considerable variation in oil and nitrogen content as also, in 24 strains examined, in other chemical characteristics. II. The average thiamin chloride (vitamin B₁) content of 29 selected strains of raw whole peanuts was 9.6 micrograms per gram, moisture-free basis. The average nicotinic acid content of 21 selected strains of raw whole peanuts was 17.2 milligrams per 100 grams. III. Trials of the present and previous workers show that the protein of peanuts can be dispersed with water about as well as by neutral salt solutions.

233. HOFMEYR, J. D. J. 634.651 : 547.944.6
The use of colchicine in horticulture with special reference to *Carica papaya* L.
Fmg S. Afr., 1941, 16 : 311-2, 332, bibl. 2.

The successful application of colchicine to plant tissue has resulted in an increase in plant vigour, brought about by a doubling of the chromosomes, in a large percentage of the plant species studied by investigators in various parts of the world. The treated material is usually the seed or terminal buds. The technique is explained in part. The possibilities are discussed. An account is given of investigations during the last 2½ years at the Nelspruit Research Station, S. Africa, as a result of which a new type of papaw has been developed. Its value in commerce has not yet been proved, since the work is still in the experimental stage.

234. DONNELLY, M. 634.653 : 581.144.2
Root distribution of young avocado trees on bench terraces.
Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 101-9, bibl. 19.

Experiments were carried out at the hill culture research station near St. Juan Capistrano, California, situated in the coastal section of the sub-tropical belt, with avocados on 4 types of bench terraces, namely the preformed, the level-basin, the Reddick, and the Japanese. The root growth observed was noted and is here discussed.

235. HOSNY, M. 632.752 : 581.144.2
On coecids found on roots of plants in Egypt.
Bull. Minist. Agric. Egypt, tech. sci. Serv., ent. Sect. 237, 1939, pp. 21, bibl. 15, P.T. 3.

PLUMMER, C. C., AND MCPHAIL, M. 632.77 : 632.96
The yellow chapote (*Sargentia greggii*) a native host of the Mexican fruitfly (*Anastrepha ludens*).
Tech. Bull. U.S. Dep. Agric. 775, 1941, pp. 12, bibl. 8.

NOLTE, M. C. A. 632.728 : 632.951.8
Dinitro-ortho-cresol and other insecticides as locust poisons : experiments of 1938-39.
Sci. Bull. Dep. Agric. S. Afr. 232 (*Chemistry Series 166*), 1941, pp. 55, bibl. 45, 6d.

TROPICAL CROPS.

236. DUTCH EAST INDIES. 63 : 371.2/3
Advies nopens organisatie en inrichting van een faculteit van landbouwwetenschap. (Recommendations concerning the organization and establishment of a faculty of agricultural science.)
Landbouw, 1941, 17 : 329-430 + 89.*

Additional impetus to the proposal to establish a Faculty of Agricultural Science in Java was provided by the temporary break in communications with the mother country and the institution is now taking shape. The many problems involved in the organization and conduct of such an institution are here studied and suitable recommendations made. A special appeal is made on behalf of the students for literature, e.g. books, bulletins and periodicals, bearing on agricultural science. Probably many of our Empire agricultural institutions have spare bulletins, etc., which would be acceptable. The address to which they should be sent [when opportunity again offers—Ed.] is Bibliotheek Landbouwfaculteit, p/a's Landsplantentuin, Buitenzorg, Java.

237. GREEN, E. C. 633/635
The cultivation of native food crops.†
New Guinea agric. J., 1941, 7 : 225-33.

Methods of cultivation of some New Guinea food crops are described. Only data obtained in experimental work will be mentioned in this abstract. *Cassava*. The best cassava soil should

* Also published in *Tectona*, 1941, 34e jaargang afl. 6 and *Ned. Indische Bladen voor Diergeneeskunde*, 1941, deel 53, afl. 4.

† Continued from *Ibidem*, 1941, 7 : 44-9, *H.A.*, 11 : 552.

not be too heavy but should be well drained and contain a good quantity of organic matter. Wet ground causes tuber rot. There are four planting methods, viz. hill, ridge, furrow and erect. Of these the last named is the most commonly used by native cultivators and the most unsuitable except in very loose, well-drained soils. The 18-inch cuttings used are a waste of material. Six inches is the correct length. The section concludes with cultural instructions on orthodox lines. *Maize*. Cultural instructions are given. In selecting seed maize for planting only the grains in the centre of the cob should be taken. Seeds from sub- or abnormal cobs will largely reproduce their cob type. *Groundnut or peanuts*. It is important (1) to remove the seed from the shell before sowing; (2) to hill up the plants frequently during growth; (3) to plant on ridges in rainy districts. *Lima bean*. Wet soils are unsuitable and very wet weather near maturity will kill many plants. *Winged beans* and *velvet beans* call for no special mention in this abstract. *Mungo beans* mature in 10 weeks. If the crop is to be used for green manure it is dug in when in full flower. *Pigeon pea*. Almost any well-drained soil will suit. A tropical climate with a long dry season is preferable. Where the peas are intended for food purposes the land must be dug before sowing and weeding must not begin until the plants are 6-9 inches high. Perennial types are cut back after harvest for further cropping except in dry weather. Frequent pickings are necessary to avoid insect attack. *Cowpea*. Practically any soil except a wet and heavy one is suitable. Wet weather causes vegetative growth at the expense of cropping. Ridge planting is recommended for wet districts. *Rice*. The cultivation of wet and dry types is described. Directions for cooking are given for most of the crops mentioned.

238: THOMPSON, A.

632.3/4

Notes on plant diseases in 1940.*Malay. agric. J.*, 1941, 29: 241-5.

Replanting by felling tall oil palms. A line of 20 tall palms, replanted in 1939 by felling after cutting the roots on the off side of the stem, have formed excellent new growth in the group where the stems were mounded to the crown. Growth is now upright but flowering has not yet occurred. Stems of some of the unmounded, felled palms are decaying (*Fomes noxius*). *Bronzing and wilting of oil palms*. Symptoms typical of this trouble have not yet developed in young palms growing in variously deficient nutrient solutions. Palms growing on an affected area showed no improvement or deterioration following a treatment in which one side was root-pruned either close to the stem or at 10 ft. from the stem, and artificial manures, composts, etc., were added to the soil replaced in the pruning trenches. A new root system formed on the pruned side within 9 months. *Coconut*. The apparent greater susceptibility of dwarf palms to leaf disease due to *Marasmius palmivorus* is probably connected with a greater humidity in the region of the crown and to an earlier accumulation of debris in the crown. Treatment included pruning the affected leaves and cleaning debris from the crown and surface. *Arecanut*. Some young palms showed cracking of the stems and later developed black rot in the inner stem tissues on the cracked side. Inoculations into healthy trees of fungi (*Pestalozzia* sp. and *Thielaviopsis* sp.) isolated from the decaying tissue gave no result. The trouble was probably initiated by sun scorch and aggravated by drought. *Tea*. Branch canker on unshaded tea on Cameron Highlands is attributed to sun scorch and an infection by *Diplodia* sp. *Pineapple*. Continued work on heart rot has not revealed the cause. *Durian* (*Durio zibethinus*). Dieback of buddings appears to be due to physiological causes. *Diplodia* sp. and *Phomopsis* sp. were in association with the trouble. *Pepper*. A serious outbreak of footrot occurred in Sarawak. It is suggested that a variety of pepper developed in Sumatra that is highly resistant to the *Phytophthora* causing the disease should be obtained.

239. GRAHAM, R. J. D.

632.111:551.566.1

The effect of low temperature on tropical plants.*Trans. bot. Soc. Edinburgh, Session 1940-41*, 1941, 33: 104-6.

An opportunity was offered for observing the effect of low temperature on tropical crops in the Tropical Stove House (kept normally with a night temperature of 60° F.) and in the Intermediate Stove House (night temperature of 55° F.) at St. Andrews between 25 October and 15 November, 1940. During this period there was no glass in the roof or in the partitioning of the two houses! The temperature records from the St. Andrews Recording Station show that during this time there was a period of sharp overnight frost from 4-6 November, with a minimum of 31° F. on

4 November, 29° F. on 5 November and 32° F. on 6 November. Of the plants concerned, all of them established for many years, 33% died, while over 38% withstood the shock either completely or with the loss only of their leaves. Among plants which showed no ill effect at all were *Hibiscus rosa sinensis* (sinensis vars. except double yellow), *Citrus decumana* and *C. nobilis*, *Mimosa spegazzinii*, *Piper nigrum*, *Ficus elastica* and *F. repens*, *Monstera deliciosa*.

240. CALLAN, E. MCC.

632.64

The control of slugs by meta bait in Trinidad, B.W.I.

Trop. Agriculture, Trin., 1941, 18: 211-3.

Meta bait, consisting of 2% mixture by weight of meta with various diluents such as wheat bran, rice bran and coconut meal and corn meal proved very attractive and toxic to the slug, *Vaginulus langsdorfi* Férussac, and ineffective against the mole cricket, *Scapteriscus vicinus* Scudder. Meta wheat bran bait was the most effective, but because of its lower cost meta rice bran actually killed more slugs per dollar. The bait was distributed in small heaps at the rate of 10 lb. per acre. Under Trinidad conditions it appears to remain toxic about a week. On a very heavily infested area the kill per acre with corn meal (which it was not possible to test simultaneously against the other diluents) was 13,368 in the first 24 hours or 17,138 per dollar costs, excluding labour cost.

241. LOOS, C. A.

632.51: 632.8

A virus disease of *Emilia scabra*.

Trop. Agriculturist, 1941, 97, 18-21, bibl. 2.

A virus disease of *Emilia scabra*, a common weed of cultivated land in Ceylon, is described. The principle symptom is a yellow vein banding. The disease is transmissible to healthy plants by grafting and differs from the spotted wilt virus of *Emilia*. The virus would only prove of importance should it be found capable of injuring a major crop, since the weed is widely distributed.

242. OTANES, F. Q., AND SISON, P. L.

633.18-2.6/7

Pests of rice.

Philipp. J. Agric., 1941, 12: 211-61, bibl. 43.

Includes notes not only on insects but also on such other pests as rodents, birds, pigs, monkeys, and on weeds, as well as on pests of stored rice. There are 18 plates, 4 in colour.

243. OCFEMIA, G. O.

633.522-2.8

Experimental transmission of the mosaic of *Canna indica*.

Philipp. Agric., 1941, 30: 357-70, bibl. 9.

It was found possible to transmit the mosaic of *Canna indica* to abacá by *Aphis gossypii* and *A. maidis* but not by *Aphis laburni*, *Pentalonia nigronervosa* or *Rhopalosiphum nymphaeae*.

244. PARRIS, G. K.

633.689

Diseases of taro [*Colocasia esculenta*] in Hawaii and their control, with notes on field production.

Circ. Hawaii agric. Exp. Stat. 18, 1941, pp. 29, bibl. 10.

Most of Hawaiian taro is produced under wetland culture, i.e. submerged, on muck or heavy clay soil of the lowlands, and irrigated. Upland taro grows at the higher levels in regions of 70 in. or higher rainfall. Brief notes are given on the handling of the land and the irrigation water and on selection of planting material, planting and manuring. Corm and root diseases mainly found on wetland taro can best be controlled by ploughing, drying the soil and not replanting with taro for 6 months to a year. Leaf diseases can be controlled by spraying with a copper fumigate or in the case of wetland taro indirectly by increasing the interplant spacing from 16 or 18 inches to 30 inches.

245. GUISCAFRÉ-ARRILLAGA, J., AND GÓMEZ, L. A.

633.73: 581.144.2

Studies of the root system of *Coffea arabica* L. Part II. Growth and distribution in Catalina clay soil.

J. Agric. Univ. Puerto Rico, 1940, 24: 109-17, bibl. 2.

A sequel to the study reported *Ibidem*, 1938, 22: 227-62; *H.A.*, 10: 1453. The present study was of six 7-year-old coffee trees averaging 273 cm. in height, 195 cm. in breadth and with a trunk diameter of 4.06 cm., growing in Catalina clay soil at Mayagüez. Results confirmed those recorded in Coloso clay. Ninety-five per cent. of the roots were found in the top 12 inches of soil. A heavy, vigorous top was correlated with an extensive root system. A fixed ratio of top to

root, approximately 3 to 1, was established. The trunk diameter was more indicative of the size of the root system than was the lateral spread of the branches or the height of the tree. The lateral and vertical spread of the roots was slightly over 4 feet. The results show that such trees as orange, avocado and banana which have superficial root systems and hence compete with the coffee roots should be eliminated from the coffee groves. Bananas, if used as temporary shade, should later be removed. Deep rooters should preferably be selected as shade trees. Coffee should be planted at distances of not less than 8 feet. When loosening the surface soil, a necessary practice for the purpose of aeration in similar soils, care should be taken not to disturb the roots.

246. WATERSTON, J. M. 632.4 : 633.74

Observations on the parasitism of *Rosellinia pepo* Pat.

Trop. Agriculture, Trin., 1941, 18 : 174-84, bibl. 34.

Attempts made in field and laboratory to gauge the factors controlling the physiology of parasitism of *Rosellinia pepo* are described. The fungus causes root disease of cacao, nutmeg and other trees of commercial importance in the West Indies. No relation was found between the hydrogen ion concentration, amount of nitrogen, organic matter, available potash and phosphate of the soil and the incidence of disease. The rate of infection of cacao seedlings was highest in the drier and better aerated soils. Whether soil moisture could be brought back to the level where host and parasite can exist together without a parasitic relationship being established requires to be determined.

247. PICKLES, A. 633.74-2.752

Scale insects of cocoa.

Proc. agric. Soc. Trin. Tob., 1941, 41 : 579-81, 583-4.

Cacao in Trinidad has been up to the present fairly free from scale. Attention is drawn to recently discovered infestations particularly on young vegetatively propagated cacao. The outbreaks have probably arisen as a result of two rather severe, successive dry seasons. The species involved are *Howardia biclavis*, the burrowing scale, and *Asterolecanium pustulans*, the akee fringed scale, referred to by the author, for brevity, as the pustule scale. Control is difficult and as yet not studied by the author. In Australia resin wash is said to be nearly as effective against scale in general as first-class fumigation and though expensive could well be used for small outbreaks.

248. PAUL, W. R. C., AND FERNANDO, M. 633.825

Cultural experiments with turmeric (*Curcuma domestica* Val.). II.* The influence of spacing, mulching and kind of seed on yield.

Trop. Agriculturist, 1941, 97 : 10-3, bibl. 2.

Turmeric plants spaced $\frac{1}{2} \times \frac{1}{2}$ ft. yielded significantly greater weight of uncured rhizomes than plants spaced 1×1 ft. or $1\frac{1}{2} \times 1\frac{1}{2}$ ft. at the experiment station, Nugawela, Ceylon, in 1940-41. No other significant results were obtained, probably because of the low number of degrees of freedom available for the estimate of error and the very small plot size.

249. CHILD, R., AND NATHANAEL, W. R. N. 633.85

The seed fat of *Garcinia echinocarpa* Thwaites—"madol oil".

Trop. Agriculturist, 1941, 97 : 78-81, bibl. 6.

The kernels of *Garcinia echinocarpa* contain 64% of a solid fat. The fat possesses notable proportions of stearic and oleic acids. It would require extensive refining and would therefore probably not be commercially profitable.

250. KOESNOTO, —. 633.88.32.491

De cultuur en de selectie van djarak (*Ricinus communis* L.) in Nederlandsch Indië. (Cultivation and breeding of castor in the Dutch East Indies.) [English summary.]

Landbouw, 1941, 17 : 460-75, bibl. 15.

The need for the extension of the relatively small cultivations of *Ricinus* for castor oil in the Dutch East Indies is stressed. This could be done on many arable lands which lie completely

* I. *Ibidem*, 96 : 265-8, H.A., 11 : 1394.

fallow in the dry season. Methods of cultivation are discussed. Breeding work is carried out at the Moeneng experiment station for drought-resistant crops, near Probolinggo, East Java. A number of promising large-seeded types have already been obtained.

251. COSTER, C. 633.912 + 633.72 + 633.88.51
 Het werk van het Proefstation West-Java in 1940. (**Work of the West-Java Research Station in 1940.**)
Bergcultures, 1941, 15 : 1124-33.

The work of the West Java Research Station in 1940 is reviewed. *Rubber*. Clonal seed gardens laid out for scientific purposes in forest clearings in different parts of Java and Sumatra are bearing their first crops of seed. Strikingly good results were obtained in manurial trials by the use of complete fertilizer NPK on poor, red lateritic soil. In good soil the results were insignificant. On soil described as Bantam type NP was profitable but K was not. Various suggestions for increasing latex yield by tapping methods are briefly mentioned. Drought killed many young budded trees. Nothing new was discovered in regard to pests and diseases but it is necessary to see that the proved methods of control are carried out, especially as regards root disease when replanting on infected land. Research in manufacture and processing is reported. *Tea*. Yield differences between heavy, medium and fine plucking probably decrease with altitude. The effect of manuring on tea differs with the soil type and with the composition of the manure used. Increased planting density led to increased yield. In the extreme example of this, i.e. hedge planting, the yield can be still further heightened by suitable manuring. *Helopeltis* was controlled by derris dusting. Failures must be blamed on wrong application or unsound materials. The last point is under investigation. Research in tea manufacture is described. *Cinchona*. Planting density and thinning present intricate problems. On the whole it can be said, as with tea, that the thicker the stand the higher the yield, which will be increased by liberal manuring. The method, new to Java, of raising and pricking out *Cinchona* seedlings under glass is very satisfactory. It eliminates the considerable check which plants pricked out in the open always receive and enables graftable *succirubra* stocks to be raised within the year. Work on insect pests, more or less in abeyance for 10 years past, is now to be resumed. Fungus diseases of various sorts are prevalent. These are now being intensively studied, especially *Phytophthora* attack. It is hoped to obtain resistant clones. Root disease should be countered in new plantations by the use of grafts on the more resistant *succirubra* in the place of seedlings on their own roots. The current chemical investigations are discussed.

252. DWYER, R. E. P. 633.912
Rubber production in New Guinea and Papua.
New Guinea agric. Gaz., 1941, 7 : 169-98, 249-79.

The various aspects of rubber production in New Guinea are presented in a survey which deals with early development, present position and economic prospects of the industry.

253. EIKEMA, J. S. 633.912-1.531
 Kiem en bewaarproeven van hevea zaden. (**Germination and viability tests with hevea seed.**)
Bergcultures, 1941, 15 : 1049-60.

Hevea seed required for planting should be picked as soon as a capsule begins to turn brown-green or yellow. As long as it is ungerminated, and this includes the seed beds, it should not be exposed to direct sunlight but kept in a cool place. At best, harvested seed can be kept in the open under shade without loss of viability for 7 days, thereafter it loses vitality quickly. In the trials discussed in this paper no seed survived this treatment longer than 21 days. The size of the seed made no difference to length of survival. Seed protected from the air lasted longer but not more than 30 days. Seed kept in slightly moist charcoal in closed containers had lost all viability in 40 days. The best results were obtained with seed packed not too tightly in powdered charcoal to which 40 grams of water per 100 grams of charcoal had been added, the containers admitting a certain amount of air. By this method after 30 days 70% of the seed was still viable. After-treatment of "twinned" seedlings is discussed and a description is given of the

Gambar method of making the twin, which the author prefers to the Raemar method [see *H.A.*, 1941, 11 : 1403]. The chief difficulty in the Gambar method lies in obtaining equal growth by both sections of the twin, which is rather necessary if the two sections are required to be comparable for experimental purposes. Suggestions for overcoming this are made, such as transplanting the more forward half to a distance of 50 cm. from its backward twin which will not be touched, while the adjacent hole left by the transplant should be filled with manure for the benefit of the one remaining. It is advisable when the seedlings are first planted after twinning to insert a strip of paraffin-waxed paper 25 cm. \times 15 cm. between the longitudinally bisected portions of the rootlet. Thus, as development proceeds, the roots of the two halves do not become entangled. An even better method is to roll the paper into tubular form, one half of the seedling being placed inside and the other outside the tube. Thus at the first transplanting all that is necessary is to lift the tube with the plant inside and replant with the minimum of root disturbance, the tube, presumably, being then withdrawn. In the Gambar method the twin bearing the plumule should occupy the pot. In the Raemar method, in which the plumule is split, and both develop equally, there is no choice.

254. SCHMÖLE, J. F. 633.912-1.541.11
Hevea brasiliensis en *Hevea spruceana* hybride als onderstam voor oculaties.
 II.* (*H. brasiliensis* and *H. spruceana* hybrids as stocks for budded rubber.) [In English and Dutch.]
Arch. Rubbertcult., 1941, 25 : 149-58, being *Meded. alg. Proefst. A.V.R.O.S. Rubberseer.* 122.

Buds of clones AV 40, 50 and 256 grow much better on stocks of *Hevea spruceana* hybrid than on *H. brasiliensis*. The crowns and stems are better developed, there is a greater thickness of both untapped and renewed bark and a greater number of latex vessels. The yield is also appreciably higher than that of buds on *H. brasiliensis*. The colour of the crêpe of trees on *H. spruceana* hybrid is yellower.

255. RUBBER RESEARCH INSTITUTE, MALAYA. 633.912-1.566.8
Practical notes on full-spiral tapping.
Circ. Rubb. Res. Inst. Malaya 18, 1941, pp. 4.

Advice is given on full spiral tapping S/1, d/4, 100% or at reduced intensities. The subjects dealt with are types of tree suitable, tapping cut and modifications, control of tapping, task size, latex collection, safeguards in full circumference tapping, alternative systems to full-spiral fourth-daily tapping at reduced intensity, estate experiments and notes on the information required in requests for advice.

256. RUSSELL, R. S. 633.912-1.566.8
Full spiral tapping. I. Preliminary review of the progress of experimental work with notes on practical aspects of full spiral tapping.
J. Rubb. Res. Inst. Malaya, 1941, 11 : 1-24, bibl. 5, being *J.R.R.I.M. Commun.* 254.

Experiments are described in which full spiral fourth-daily tapping (S/1, d/4, 100%) has been compared with alternate-daily tapping on half spiral cuts (S/2, d/2, 100%) on both budded and seedling rubber trees. The following conclusions are reached. For young trees under 24 inches in girth S/1, d/4, 100% is unsuitable as a permanent tapping system on account of retardation of growth, though for several years yield may be increased and tapping costs lowered. With older and larger trees of high-yielding rubber it is probable, though not yet conclusively proved, that the full-spiral tapping system in question could be used permanently with advantage. Practical aspects of full-spiral tapping are discussed. [From author's summary.]

257. ANON.† 633.912-1.83
Potash supplies : smoke house ash and coconut husk ash.
Plntrs' Bull. Rubb. Res. Inst. Malaya, 1941, No. 15, p. 17.

Smoke house ash on rubber estates is rich in potash which, however, is soon washed out if left exposed to rain. If all smoke house ash on Malayan estates were preserved and protected from

* For I see *Ibidem*, 1938, 22 : 178-81, *H.A.* 9 : 266.

† On information supplied by the Dep. Agric. S.S. and F.M.S.

rain the equivalent of 1,200 tons of muriate of potash per annum, sufficient for the present needs of Malayan estate rubber, would be obtained. The ash of coconut shells and husks are rich in potash (40-50% K₂O), the husk giving 4 times as much ash as the shell, weight for weight. The ash from all the husks on Malayan estates plus the ash produced in copra kilns would produce 400-450 tons of muriate of potash.

258. DE FLUITER, H. J. 633.912-2.76
 Waarnemingen omtrent engerlingen (oerets) en hun bestrijding in hevea-aanplantingen. (**Observations on white grubs or beetle larvae of several species and their control in rubber plantations.**) [English summary 9 pp.]
Arch. Rubbercult. Ned. Ind., 1941, 25 : 167-265, bibl. 29, being *Meded. Besoek. Proefst. Malang* (unnumbered).

Mechanical, chemical, agricultural and biological methods of control are considered.

259. S.S. AND F.M.S. DEPARTMENT OF AGRICULTURE. 633.912
The Malayan rubber planting industry in 1940.
Malay. agric. J., 1941, 29 : 273-82.
 Records of the Economics Branch.
 DE JONG, W. H. 633.912-2.4
 Over de bestrijding van eenige ziekten, die houtwonden aan het onderste deel van den stam van hevea veroorzaken. (**The control of some diseases arising through wounds at the base of hevea trunks.**)
Bergcultures, 1941, 15 : 1134-7, bibl. 3.
 VAN DER BIE, G. J., AND WIJNHAMER, P. T. 625.75
 Eigenschappen van asphaltbitumen-rubber mengsels, welke van belang zijn voor den wegenbouw. (**Properties of mixtures of asphaltic bitumen and rubber for road purposes.**) [English summary 5½ pp.]
Arch. Rubbercult. Ned. Ind., 1941, 25 : 18-141, bibl. 21, being *Meded. Afd. Rubb. Res. Proefst. West-Java* 29.

260. BARTLETT, K. A. 634.1/7-2.77-2.96
The introduction and colonization in Puerto Rico of beneficial insects parasitic on West Indian fruit flies.
J. Agric. Univ. Puerto Rico, 1941, 25 : 25-31.

The parasites discussed are those of the West Indian fruit flies *Anastrepha mombinpraepoetans* and *A. suspensa*.

261. HOPKINS, J. C. F. 634.441-2.421
Diseases of fruit, flowers and vegetables in Southern Rhodesia. 4. Mildew of mangoes.
Rhod. agric. J., 1941, 38 : 470-1.

An *Oidium* species is the cause of mildew on mango. The remedy is sulphur dusting (proprietary products, not flowers of sulphur) or wet spraying with colloidal sulphur.

262. PIERIS, W. V. D. 634.61
Coconut cultivation in the island of Trinidad, British West Indies.
Trop. Agriculturist, 1941, 96 : 328-46, bibl. 40.

A review of coconut cultivation in Trinidad by the Geneticist, Coconut Research Scheme, Ceylon. The author does not conceal his opinion that the methods (or lack of them) found on coconut estates in Trinidad compare ill with those of Ceylon. Every aspect of the industry is passed under review and criticisms, though trenchant, are constructive. The author considers that low yields and dying trees are not dispensations of providence but are brought about largely by remediable neglect.

263. SALGADO, M. L. M., AND CHINNARASA, E. 634.61 : 581.162 : 631.83
The potash content of coconut husks and husk ash.
Trop. Agriculturist, 1941, 97 : 68-73, bibl. 2.

Values for potash content of coconut husks and husk ash previously recorded were high and exceptional. Potash content showed considerable variation depending on soil and seasonal

factors. Good correlation was obtained between the potash content of husks and the corresponding husk ash. Average tentative values of potash content of husks in relation to different coconut soil types are given. Burning husks in pits rather than in a kiln is recommended. [From authors' summary.]

264. WILSHAW, R. G. H. 634.61-1.8

Results of manurial and cultivation experiments on coconuts.

Malay. agric. J., 1941, 29: 267-72, bibl. 1.

Two manurial experiments, both of which gave negative results, were carried out on young coconuts on heavy coastal clay. In the first the effect of early manuring of the young palm on the subsequent yield of nuts was tested, the second deals with combined manurial and cultivation treatments for young mature palms.

265. CHILD, R., AND SALGADO, M. L. M. 634.61-1.8: 658.8

The effect of manuring coconut palms on the oil and protein contents of the copra.

Trop. Agriculturist, 1941, 97: 4-9, bibl. 3.

Neither the oil nor the nitrogen content of copra was affected by different manurial treatments to the coconut palms during the second year after application.

266. HAWAII AGRICULTURAL EXPERIMENT STATION. 634.651

Papaya production in the Hawaiian Islands.

Bull. Hawaii. agric. Exp. Stat. 87,* 1941, pp. 64, bibl. 59.

STOREY, W. B.

I. The botany and sex relationships of the papaya, pp. 5-22.

JONES, W. W., AND STOREY, W. B.

II. Propagation and culture of the papaya, pp. 23-31.

PARRIS, G. K.

III. Diseases of papaya in Hawaii and their control, pp. 32-44.

HOLDAWAY, F. G.

IV. Insect pests of papaya and their control, pp. 45-51.

JONES, W. W.

V. Harvesting, marketing and uses of papaya, pp. 52-60.

I. A general botanical description of *Carica papaya* is given including flower types, fruits and tree forms. The results of genetical studies and the application of the genetics of sex to seed selection are discussed.

II. Almost any well-drained soil in the tropics is suitable. A sunny situation is necessary for optimum growth. Propagation is by seed from fully ripened fruit, germinated in flats which are placed in full sunlight while the cotyledons are still large and green. The seedlings are pricked out singly into pots or more economically into discarded cans, suitably perforated for drainage, or even into home-made paper cylinders 3 inches in diameter and 4 inches deep. The plants are set out, usually singly, in the orchard when 3-4 weeks old and 6-8 inches high. In Hawaii multiple planting of the favourite Solo variety, up to 4 to a hole, is often practised, with a view to retaining by selective thinning a hermaphrodite plant for its desired pyriform fruit. Cultivation consists in occasional shallow harrowing—not deeper than 3 inches—to avoid root damage. Manuring is necessary on Hawaiian soils. Nitrogen or phosphorus deficiency results in a marked reduction in growth and in number of leaves. In the case of nitrogen deficiency the leaves are small, stiff, short petioled and light yellow, in that of phosphorus they are dark green with a purplish-red colouration on veins and petioles. Water shortage will also produce these symptoms since these elements cannot then be absorbed from the soil. For Hawaii a formula high in phosphorus is recommended as the result of preliminary manurial experiments.

III. The papaya is very susceptible to disease if in unfavourable growing conditions. Those dealt with here are anthracnose (*Colletotrichum*), *Alternaria* fruit rot, powdery mildew (*Oidium caricae*), *Phytophthora* rot, root rot (*Pythium* and *Fusarium* spp.), damping off (*Pythium* and *Rhizoctonia* spp.), root knot caused by nematodes (*Heterodera marioni*), papaya mosaic.

* This publication supersedes two earlier bulletins (18, 40) now out of print.

IV. Mites, aphids and thrips cause some damage.

V. An account is given of the ripening processes. Picking is at the firm-ripe stage, i.e. as soon as the first traces of yellow occur. Disinfestation treatments for fruit fly (compulsory before shipment) are described. The collection of dried latex for the extraction of papain receives some attention. Potash starvation is disastrous to papain yield, while lack of phosphorus seems to have no effect in this respect.

267. BURMA, DEPARTMENT OF AGRICULTURE.

634.771/3

Plantain.

Markets Section Survey Dep. Agric. Burma 6 : 1941, pp. 20, As. 4=5d.

This report was submitted for publication in 1935. Certain statistics relating to area and rail-borne supplies received later than 1935 are included in appendixes. The word plantain here includes banana which, however, only comprises some 20% of the fruit produced. All fruit is for local consumption. The area under plantain in Burma, excluding Federated Shan States, amounted to 61,436 acres in 1939-40.

268. CROUCHER, H. H.

634.771-2.48

Efficient spraying to control leaf spot.

J. Jamaica agric. Soc., 1941, 45 : 284, 286-7.

The effectiveness of spraying banana for *Cercospora* leaf spot can be judged by the number of spots on the leaves and by the number of leaves that are functioning. A scale table is given by the aid of which the intensity of infection on sprayed or unsprayed trees may be classified. Lack of control is due to neglect to spray in the proper cycles, to poor coverage due to careless application or inefficient machines, or to badly prepared spray mixtures. Each of these faults and the appropriate remedial measures are discussed.

269. WILLIAMS, R. O.

635.1/7 : 551.566.1

Grow your own food.

Proc. agric. Soc. Trin. Tob., 1941, 41 : 513, 515, 517-9, 521, 523-5, 527, 529-35.

A lecture delivered at a demonstration of vegetable gardening in Trinidad. It contains useful information on gardening methods in the tropics at low altitudes and so differs from most published information on this subject which considers mainly high altitude conditions. Five pages entitled "Vegetable time table and cultivation notes" will prove of more than local use in showing what vegetable crops can be reasonably expected to succeed at low levels in the humid tropics.

270. BOND, T. E. T.

632.4 : 635.52 + 635.939.516

Leaf spot diseases of lettuce and antirrhinum.

Trop. Agriculturist, 1941, 97 : 62-7, bibl. 12.

An account is given of 2 leaf spot diseases new to Ceylon, *Septoria lactucae* Pass. and *Phyllosticta antirrhini* Syd. on lettuce and antirrhinum respectively. Suggestions for control are given.

271. FERNANDO, M., AND UDURAWANA, S. B.

635.62 : 632.77

The relative resistance of some strains of bitter-gourd to the cucurbit fruit-fly.

Trop. Agriculturist, 1941, 96 : 347-52.

Of five locally selected strains of bitter-gourd (*Momordica charantia*) four known as CD varieties, green rough, green smooth, white rough and white smooth, showed some resistance to fruit fly (*Dacus cucurbitae*) at the Vegetable Seed Station, Matale, Ceylon, during the period 1938-41. Of these the strain CD, green rough, was superior to all in resistance and yield.

272. BOLHUIS, G. G.

635.655

Een cultuurmethode (uitzaai) proef met kedelee. (An experiment in sowing soybeans.)

Landbouw, 1941, 17 : 486-9.

White (yellow) and especially large seeded white soybeans are in highest demand in Java. These are not always satisfactory when sown direct in the rice stubble. Three methods of sowing were tried experimentally. A. The rice straw was cut, 2 seeds each put in open holes 20 × 20 cm. apart

among the stubble and the straw pulled back over the holes. B. As A but the holes were filled with dry sand after sowing and before replacing the straw. C. The seeds were broadcast in the standing straw at the rate of 50-147 kg. per ha. according to size, and the straw was then cut over them for covering. The variety Ringgit failed and was discarded. The comparative results with 3 other varieties, the very large seeded Mandsjoerije, the large seeded Lawoe and the small seeded No. 29, are discussed. A table is given showing the amounts of seed required per ha. for sowing in stubble and seed bed respectively for each of the 3 varieties remaining in the trial.

273. CHARTER, C. F. 631.4

A reconnaissance survey of the soils of British Honduras.

Government of British Honduras, Belize, 1941, pp. 31, bibl. 16.

KOCH, D. E. V. 551.57.018 : 631.84

The nitrogen content of Ceylon rain.

Trop. Agriculturist, 1941, 97 : 74-7, bibl. 4.

JULIANO, J. B. 633.18

Progress in rice research in the Philippines.

Philipp. J. Agric., 1941, 12 : 125-39, bibl. 1286.

Number of references noteworthy.

TURNER, P. E. 633.61

A.R. Field experiments on sugar cane in Trinidad for 1941.

Sugarcane Investigation Cttee. of Trinidad, pp. 185.

CHARTER, C. F. 633.61-1.4

A brief description of the sugar cane soils of Trinidad.

Ibidem, pp. 186-96.

INNES, R. F. 633.61-1.55

A survey of the yields of sugar cane in Jamaica 1939-1940.

Bull. Dep. Sci. Agric. Jamaica 28, 1941, pp. 38.

GRANER, E. A. 547.944.6 : 633.682

Polyploid cassava induced by colchicine treatment.

J. Hered., 1941, 32 : 281-8, bibl. 4.

FURTADO, C. X. 633.689

***Alocasia macrorrhiza* and its varieties.**

Gdns' Bull. S.S., 1941, 11 : 244-57, bibl. 54.

From a botanical standpoint.

EDEN, T. 633.72-2.51

Studies in the yield of tea. IV. The effect of cultivation and weeds on crop growth.

Tea Quart., 1941, 14 : 47-60, bibl. 17, reprinted from *Emp. J. exp. Agric.*, 1940, 8 : 269-79; *H.A.*, 11 : 193.

HARDON, H. J., AND NIJHOLT, J. A. 633.88.32.491 : 581.192

Over de samenstelling van inheemsche djarak-zaden (*Ricinus communis* Linn.). (The composition of indigenous castor seeds.) [English summary.]

Landbouw, 1941, 17 : 476-85, bibl. 9, being *Meded. Lab. Scheikundig Onderz. Buitenzorg* 95.

STORAGE.

274. WHITACRE, W. R. 634.11-1.564

Packaging problems of Eastern apple growers.

Bull. Pa agric. Exp. Stat. 409, 1941, pp. 14.

A discussion of the prevalence, characteristics and advantages and disadvantages of the apple containers most commonly found in Pennsylvania markets. These are the bushel basket, the bushel box, the $1\frac{1}{8}$ bushel box and the $1\frac{1}{5}$ bushel box. The basket with its tendency to allow crushing and the $1\frac{1}{5}$ bushel box are gradually being eliminated.

275. MONRO, H. A. U.

632.944 : 664.84/85

Vacuum fumigation for insect control.*Sci. Agric.*, 1941, 22 : 170-7, bibl. 10.

The author discusses the process known as vacuum fumigation which, as he points out, is the term used for low pressure fumigation. One of the disadvantages is that insects thus killed in food products are not thereby removed and that whereas the presence of live insects in one's food is unpleasant that of dead ones is even more distasteful. He considers that the possibility of finding some agent which will make the insects emerge from the products before being killed by poisonous fumes must be thoroughly investigated.

276. KROTKOV, G.

664.85.11

The respiratory metabolism of McIntosh apples during ontogeny, as determined at 22° C.*Plant Physiol.*, 1941, 16 : 799-812, bibl. 4.

1. A number of continuous respiration records of McIntosh apples is presented. These were produced by samples of apples taken throughout the whole ontogeny of the fruits, and stored at 22° C. 2. A complete respiration record of a fruit is found to consist of a pre-climacteric and a climacteric period. The relative importance of these two periods in various stages of fruit ontogeny is described. It is shown that the earliest records are represented by the preclimacteric and the latest by the climacteric periods only. 3. A tentative explanation is given of changes in a complete respiration record, based on the assumption that these are due to variations in the concentration of the respiratory substrate. 4. From the data presented it is concluded that a fungal infection did take place only after an apple had reached a definite physiological stage of its starvation, and when disintegration of its protoplasmic organization already was taking place. Fungal infection, consequently, was one of the consequences of death, not the cause of it. 5. The life in days is given for the apples in various stages of their ontogeny. From the beginning of July and onward, a direct proportionality is observed between the duration of life and the total amounts of the CO₂ produced by apples in the climacteric period of their respiration. 6. The value of the reported work is considered to be two-fold : first, it gives a general idea of the respiratory metabolism of McIntosh apples during their ontogeny ; second, it may serve as a kind of time table, so that if in the future it is decided to investigate in detail any particular stage of metabolism, one can choose for this purpose the best suited age of apples, and one knows how far apart samples for analysis should be taken. [Author's summary.]

277. SMOCK, R. M., AND VAN DOREN, A.

664.85.11.035.1

Controlled atmosphere storage of apples.*Bull. Cornell agric. Exp. Stat.* 762, 1941, pp. 45, bibl. 21.

This report summarizes 4 years' work on gas storage of McIntosh apples and shorter trials with 12 other varieties of apple. Results with each variety are discussed separately. McIntosh responded the best and its storage life can be doubled by storing at 40° F. in an atmosphere of 5% CO₂ and 2% O₂. Brown core was entirely avoided by gas storing this apple. Northwestern Greening, Twenty Ounce, Golden Delicious, Rome Beauty, Delicious and Northern Spy responded fairly well to similar storage in a one-year trial. Scald may cause trouble in the first four. Cortland was very susceptible to scald in one out of the two years of trial. Rhode Island Greening proved very susceptible to brown core and one year to scald. Jonathan was susceptible to internal browning but avoided Jonathan spot when gas stored. Baldwin and Wealthy were in their one-year test seriously affected by brown core. The authors give numerous illustrations and diagrams of apparatus and stress points which appear to be essential to successful gas storage.

278. SNYDER, J. C.

664.85.13.037

Ripening fall and winter pears.*Ext. Bull. Wash. St. Coll.* 258, 1940, pp. 2.

Pears should be taken from store and ripened in a room where the temperature lies between 60° and 70° F. The storage life of the different varieties varies considerably, and if this is exceeded the pears will not ripen satisfactorily.

279. REYNEKE, J. 634.25-1.547.6 : 664.85.25.037.
The final ripening period in relation to woolliness of Peregrine peaches.
Sci. Bull. Dep. Agric. S. Afr. 228 (Stellenbosch Series 45), 1941, pp. 19, bibl. 5,
 3d.

Previous experiments showed that woolliness in peaches is associated with physical rather than chemical changes in the composition of the fruit. Commercial picking is done with the fruit in three stages of ripeness:—A. Hard and juicy. B. Soft and juiceless. C. Soft and juicy. During 24 hours of delay before storage A stage fruit develops into the B stage, B increases rapidly in juiciness and the increase in juiciness of C fruit is more gradual. But at the end of this 24 hours A stage fruit has now become juiceless and fruit put into cold store in a juiceless condition remains in that condition and will emerge "woolly". If storage is delayed a further 24 hours, juiciness increases rapidly in the order $A > B > C$, a maximum juiciness then being reached. Woolliness is, then, a continuation of the temporary juiceless condition through which fruit normally passes before reaching the fully ripe stage. It is suggested that, (1) fruit intended to reach cold store approximately 24 hours after picking should not be picked before the juiceless stage has been passed and (2) fruits arriving at the docks, which have not yet attained a certain minimum content of expressible juice, should not be allowed to enter cold store.

280. JOACHIM, A. W. R., AND PARSONS, T. H. 664.85.037 : 551.566.1
A note on some preliminary cold storage investigations relating to Ceylon fruits.
Trop. Agriculturist, 1941, 96 : 353-8, bibl. 3.

The optimum storage temperatures and commercial storage life of a number of Ceylon fruits were ascertained in a series of experiments beginning in 1937 as under. *Mango*. Mature but hard, 40°-45° F., 3 weeks. *Mangosteen*. 45°-50° F., 3 weeks. *Grapefruit*. Walters 40° F., Marsh Seedless 45° F., 8 weeks. *Orange*. From Bibile, variety not stated, 35° F., 7 weeks, local green 40° and 45° F., 4 weeks. *Mandarin*. Beauty of Glen, Emperor and Nagpur 40° and 45° F., 4 weeks. *Sapodilla*. 40° and 45° F., 1 week. *Pineapple*. Kew 45°, 50°, 55° F., 6 weeks. Later trials proved disappointing owing to disease brought about by wet conditions during growth. *Custard apple*. 50° F., 2 weeks. *Soursop*. 45° F., 3 weeks. *Cherimoyer*. 45° F., 2 weeks. *Papaw*. 50°-55° F., 2 weeks. *Avocado*. 40° F., 2-3 weeks. *Bael* (*Aegle marmelos*). 45° F., 8 weeks. Data are also given in an appendix of the mean storage life, i.e. up to time of 50% spoilage and of maximum duration of storage, i.e. at the end of which spoilage is 100%. The shorter commercial storage life compared with that of similar varieties in other countries is noted, except for citrus, without explanation. Citrus quality had been adversely affected by prolonged droughts in 1939 and 1940.

281. BARNELL, H. R. 664.85.771
Studies in tropical fruits. XIII. Carbohydrate metabolism of the banana fruit during storage at 53° F. and ripening at 68° F.
Ann. Bot., Lond., 1941, 5 : 607-46, bibl. 38.

The subject of the present investigation, carried out at the Low Temperature Research Station, Trinidad, has been the changes which occur in the carbohydrates of banana fruit cut at $\frac{3}{4}$ -full and heavy $\frac{3}{4}$ -full grades and given periods of cold storage equal in length to those required for transportation to England and Canada respectively, followed by the standard ripening procedure. The effect of the prolongation of cold storage for each grade has also been investigated so that some aspects of the chemical nature of the abnormalities in the eating and other qualities associated with "chilled" fruit could be observed.

282. LEONARD, E. R. 634.771 + 664.85.771
The banana trade from the West Indies to Canada.
Trop. Agriculture, Trin., 1941, 18 : 244-6, bibl. 8.

An account of the present-day methods of transport, ripening and distribution of bananas in the trade between the British West Indies and Canada, with some criticisms, compiled from data obtained from personal observation in 1940. The author considers an improvement in the condition of the fruit on discharge is necessary, after which an outlay on the improvement of the ripening rooms at the receiving end should follow.

283. DENNY, F. E., AND THORNTON, N. C. 633.491 + 664.84.21.037
Potato varieties : sugar-forming characteristics of tubers in cold storage, and suitability for production of potato chips.
Contr. Boyce Thompson Inst., 1941, 12 : 217-52, bibl. 6.

A temperature of 7° C. was found to be most generally satisfactory for storing potatoes destined for chips. The degree of suitability of the 25 varieties tested, judged by different reducing sugar values, liability to sprout, production of dark chips, etc., is discussed. Neither soil nor origin appears to affect the amount of reducing sugar produced during storage.

284. KARMARKER, D. V., AND JOSHI, B. M. 664.84.21.037
Investigations on the cold storage of potatoes.

Misc. Bull. imp. Coun. agric. Res. India 45, 1941, pp. 22, bibl. 41.

Investigations were carried out for 3 years, 1936-1939, on the cold storage of potatoes of 8 varieties at the Cold Storage Research Scheme, Ganeshkhind Fruit Experiment Station, Kirkee. Potatoes sprouted at all temperatures above 35° F. At 35° F. they remained dormant indefinitely. It was also possible to store them for 9 months without sprouting at 40° F. provided they were stored soon after being harvested. At 35° and 40° they remained perfectly sound; at 30° and 32° they developed black heart after 3 and 5 months' storage respectively. Germinating power was unimpaired by storage at 35° and 40°. Loss of weight during storage depended on pre-storage conditions, being about the same at 35° and 45° F. There was a marked accumulation of sugars in tubers stored at 30° and 35° F. There were no significant changes in the water, nitrogen and acidity content. Rates of respiration up to 5 months in store were roughly equal at 32°, 35° and 40° F.

285. DENNY, F. E., AND THORNTON, N. C. 664.84.21.037
Carbon dioxide prevents the rapid increase in the reducing sugar content of potato tubers stored at low temperatures.

Contr. Boyce Thompson Inst., 1941, 12 : 79-84, bibl. 4.

The rapid increase in reducing sugar which occurs in potatoes stored at 5° C. was prevented by storing the tubers (Irish Cobbler) in an atmosphere containing 5% CO₂.

286. DURHAM, H. E. 633.491
Potatoes.

Gdnrs' Chron., 1941, 110 : 184-5.

Methods to prevent the annual wastage through sprouting of stored potatoes are discussed. The possible lines of attack are the use of late sprouting varieties, e.g. Sutton's Fir Apple and the French variety Rose, and procedures to prevent premature sprouting. From recent experience it is suggested that exposing the tubers on the ground before storing for two days might be effective in delaying sprouting. Killing the eyes by immersing the tubers in a 10%-15% solution of sodium chlorate is a promising method but preliminary experiments have shown that a non-toxic antiseptic is also needed to control an increased susceptibility to fungous disease.

287. ANON. 635.64 : 631.547.6
On ripening tomatoes.

Gdnrs' Chron., 1941, 110 : 121.

This year outdoor tomatoes in England have failed to ripen well, probably not, on this occasion, through lack of sunshine but because of low night temperatures. Fruit still green but grown to full size will ripen off well if properly stored though the fruit has less flavour than if gathered ripe. Picked green tomatoes ripen fast in sunlight and more slowly in the dark, hence the judicious use of darkness for storing will extend the season. If a cool situation is added to darkness, ripening will be still longer delayed. Wrapping separately in paper hastens ripening. Tomatoes picked in various stages of maturity and kept in a haybox will ripen in succession up to March.

288. WINTER, J. D., AND NOBLE, I. 664.85.037 + 664.84.037
Frozen fruits and vegetables for home use.
Ext. Bull. Minn. agric. Ext. Div. 200, 1940, pp. 8.
 Notes on small scale home freezing.

CLENDENNING, K. A.

664.84.64

Studies of the tomato in relation to its storage. II. The effects of altered internal atmosphere upon the respiratory and ripening behaviour of tomato fruits stored at 12·5° C.

Canad. J. Res., 1941, 19, Sec. C, pp. 500-18, bibl. 17.

Includes the effect of waxing.

BIALE, J. B.

664.85.653

The climacteric rise in respiration rate of the Fuerte avocado fruit.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39 : 137-42, bibl. 7.

PROCESSING AND PLANT PRODUCTS.

289. MORGAN, A. F.

577.16 : 634.1/8

A nutritive index of fruits.

Fruit Prod. J., 1941, 21 : 75-7.

Fruits are not high caloric foods nor protein-rich foods. They are rich in mineral constituents in comparison with their energy value. They are the outstanding source of vitamin C. They contain the B vitamins, namely B₁ riboflavin, B₆ or pyridoxin, nicotinic acid and the filtrate factors, in varying amounts and assortment. They are in some cases rich in carotene, the provitamin A. Thus carotene is present in large amounts in apricots, prunes and yellow peaches. Fruits, then, obviously contribute chiefly mineral and vitamins to the diet. After discussing the varying amounts of vitamins, minerals and calories afforded by them the author classes the more common fruits roughly as follows :—(1) Fruits providing substantial amounts of ascorbic acid (in descending order of content)—oranges, strawberries, lemons, grapefruit, tomatoes. (2) Fruit providing substantial amounts of vitamin A—dried apricots, prunes and peaches, apricots, tomatoes, peaches, cantaloupes. (2) Fruits affording miscellaneous, mainly mineral, value—dried figs, apples, raisins, dates, pears, and fresh or canned pineapple, berry fruits, cherries, plums, grapes, apples, bananas, pears and water melons.

290. CRUESS, W. V.

577.16 : 664.84 + 664.85

Changes in dietary value during food preservation.

Fruit Prod. J., 1941, 21 : 40-2.

A brief, concise account is given of the changes in dietary value likely to occur in mineral constituents, vitamins A, B and C and riboflavin in vegetables and fruits as the result of the following treatments :—Blanching (1) in water, (2) in steam ; sterilizing (1) at 212° F., (2) at 240-250° C. ; freezing storage ; sun drying (1) un sulphured and (2) sulphured fruits ; alcoholic fermentation ; lactic fermentation.

291. DOWNER, A. W. E.

577.16 : 581.192

Determination of ascorbic acid.

Chemistry and Industry, 1941, 60 : 868, bibl. 4.

Deals with the necessity of removing SO₂ from fruit juices preserved therewith before the ascorbic acid content can be estimated by titration with indophenol. The method of removal suggested is by gentle distillation in a current of carbon dioxide of the diluted juice containing 5% v/v of phosphoric acid. Provided the juice is de-aerated before distillation by subjecting it to reduced pressure 98% of added ascorbic acid can be recovered. Other methods are mentioned.*

292. GRAVES, H. C. H.

635.1/7 : 581.192 : 577.16

The vitamin A value of carotene in vegetables.

Chemistry and Industry, 1942, 61 : 8-10, bibl. 17.

The author discusses the special problems of assessing the value of vitamin A in the form of carotene in common vegetables and the confusion arising partly from the fact that some workers convert the carotene or "provitamin" content of food into "international units" of vitamin A regardless of the fact that it is the biological activity of 0·6 mg. of the international standard which is by definition one international unit. He considers that, when matters of policy affecting national nutrition are being considered, no results should be accepted unless supported by biological findings. He suggests that the following figures indicate the relative vitamin A activity

* See also *Ibidem*, pp. 851-2.

of the foods mentioned. Biological activity (international units per 100 grams):—Spinach, watercress and broccoli leaves 12,000 each, carrots 7,500, lettuce, tomatoes and apricots 3,000 each, brussels sprouts 1,700 and peas and cabbage 1,000 each.

293. MRAK, E. M. 577.16 : 664.85.047 + 664.84.047

Retention of vitamins by dried fruits and vegetables.

Fruit Prod. J., 1941, 21 : 13-5, bibl. 18.

1. Steam blanching tends to preserve vitamins A, B and C in dehydrated vegetables. Rapid drying generally favours vitamin retention. 2. Sulphuring preserves vitamins A and C and riboflavin in dried fruits but tends to destroy vitamin B₁. Dehydration results in better vitamin retention than sun-drying. 4. Alkaline dips do not destroy vitamins A, B and riboflavin. 5. Vitamin loss in store is related to temperature, time of storage and moisture content of fruit. Darkening and loss of vitamins A and C increase with decreased SO₂ content. 6. Storing fruit with as little as 12-14% moisture would retard loss of SO₂ and hence deterioration of vitamins A and probably C. 7. Cut fruits sometimes contain less than 400 p.p.m. of SO₂ which is too low from the standpoint of vitamin A preservation. Dehydration might well solve this problem.

294. POE, C. F., AND MCGUIRE, E. G. 577.16 : 663.813 : 635.64

The vitamin B₁ content of commercially canned tomato juices.

Fruit Prod. J., 1941, 21 : 108-9.

Average vitamin B₁ content of tomato juice was 20.6 units per 100 c.c., the filtered and unfiltered juices containing the same amounts.

295. KIRK, M. M. 577.16

Polarographic determination of ascorbic acid.

Industr. Engng Chem. (Analytical Edition), 1941, 13 : 625-6, bibl. 5.

KIRKPATRICK, H. F. W. 663.813 : 577.16

The determination of ascorbic acid and sulphur dioxide in fruit juices.

J. Soc. chem. Ind., Lond., 1941, 60 : 226-9, bibl. 2.

MEIKLEJOHN, G. T., AND STEWART, C. P. 635.63 : 577.16

Ascorbic acid oxidase from eucumber.

Biochem. J., 1941, 35 : 755-60, bibl. 8.

MOORE, L. A., AND ELY, R. 577.16

Extraction of carotene from plant material. A rapid quantitative method.

Industr. Engng Chem. (Analytical Edition), 1941, 13 : 600-1, bibl. 4.

296. WEAST, C. A., AND MACKINNEY, G. 664.85.047 + 663.813

Nonenzymatic darkening of fruits and fruit products.

Industr. Engng Chem. (Industrial Edition), 1941, 33 : 1408-12, bibl. 11.

Analysis has been made of a dark compound isolated from nonenzymatically blackened dried apricots. This compound found in apricots and other dried fruits is a constituent of some magnitude, 5%-7%. In such cases an abnormality in the levulose and free amino acid contents has been shown. The isolated material contains 3.26% nitrogen and this is probably derived from aspartic acid. It is thought that a free amino acid plays an important part in the darkening.

297. SUGIHARA, J., TSU, S. T., AND CRUESS, W. V. 664.84.047

Effect of blanching on dehydrated vegetables.

Fruit Prod. J., 1941, 21 : 104-6.

Blanching of vegetables before dehydration was shown to be very beneficial to flavour, odour, texture and general cooking quality. Better flavour and odour and less loss of nutrients resulted from blanching in steam than in water.

298. HIGBY, R. H. 663.813 : 634.31

Canning navel orange juice.

Calif. Citogr., 1941, 26 : 360, 380, 382, bibl. 3.

Canning of Washington Navel oranges has been largely discouraged by the bitter taste and astringency which develops in the juice when standing exposed to air or when pasteurized. The

bitter principle, limonin, has now been isolated and identified. The degree of bitterness decreases with maturity. The problems presented were (1) to find the earliest dates at which navel oranges in the various districts were fit for canning, (2) to devise means of juice extraction which would minimize the solution of the bitter-forming substance in the juice (limonin is found in the centre bundle, the albedo and veins, but not in the juice itself) and (3) to find methods of treatment which would prevent the hydrolysis of the bitter-forming complex during processing, canning and storage. In the laboratory (2) was solved by trimming off the navel formation before burring and by burring out in a manner calculated to reduce the maceration of section coverings, centre bundle and albedo to a minimum and by screening immediately after extraction. To deal with (3) the juice should be buffered immediately to pH 3.8-4.0 and thoroughly de-aerated before pasteurization. Canning procedure must not allow any admixture or reabsorption of air into the juice.

299. LOEFFLER, H. J. 663.813 : 634.3
Processing of orange juice. Effect of storage temperature on quality factors of bottled juice.

Industr. Engng Chem. (Industrial Edition), 1941, **33** : 1308-14, bibl. 30.

High-temperature pasteurization is recommended to retain the "cloud" in orange juice, followed by rapid cooling to avoid cooked flavors. Quantitative methods using a photo-electric colorimeter have been devised for measuring vitamin C, color, cloud and amino nitrogen content. These tests indicate that during warm storage of pasteurized orange juice, carbon dioxide is produced, the color darkens, vitamin C is lost, the "cloud" settles (unless a sufficiently high pasteurization temperature has been used), and off-flavors develop. These changes are prevented by cool storage [at 40° F. or lower]. Appreciable vitamin C may be lost from frozen juice stored at 0° F. (-18° C.) in the presence of air. [Author's summary.]

300. HEID, J. L. 547.313.2 : 664.85.3 : 547.458.88
The effect of ethylene treatment upon the recovery of citrus pectin.

Fruit Prod. J., 1941, **21** : 100-3, 125, bibl. 21.

Experiments show that when citrus fruits have been treated with ethylene prior to storage the method of extracting the pectin needs modification for maximum yields.

301. VAN ANTWERPEN, F. J. 634.3-1.57
Utilization of citrus wastes.

Industr. Engng Chem. (Industrial Edition), 1941, **33** : 1422-6, bibl. 3.

This article describes the processing of citrus waste, peel, seed and rag from canning and juicing establishments at Tampa, Fla, and discusses the use of the final product. The primary users of the dried feed produced [10 ton wet peel produces 1 ton dried feed] are dairy cattle. It has a density of 18 lb. per cubic foot. This bulky material will absorb 5-8 times its weight of water and is of value in maintaining enough water in the diet. It competes with beet pulp but is cheaper, \$30 as against \$40 a ton. Guaranteed analysis of the feed is :—crude protein not less than 6% ; crude fat not less than 2.5% ; crude fibre not more than 20%.

302. FILIPELLO, F., AND MARSH, G. L. 638.16 : 663.51
Honey wine.*

Fruit Prod. J., 1941, **21** : 78, 79, 90, bibl. 2.

A very brief outline of the process of making honey mead and honey brandy.

303. PAYNE, J. H., LEY, G. J., AND AKAU, G. 633.689-1.56
Processing and chemical investigations of taro.

Bull. Hawaii agric. Exp. Stat. **86**, 1941, pp. 42, bibl. 28.

An illustrated description of the processing of taro and of the many food uses to which it may be put. It can be converted into flour, which can be substituted for 15 to 20% of wheat flour in many baked products. It can provide a beverage powder. It can be made into breakfast flakes, etc. Taro food products are of value in preparing diets for wheat allergy cases. It can

* Article reprinted by request from *Ibidem*, 1934, **14** : 40-1.

be canned as a substitute for starchy foods. Complete chemical analyses are given of 2 wetland and 2 upland varieties of taro. A number of taro food recipes are included.

304. ALTMAN, R. F. A. 633.912 : 678.11 : 581.192
Organische analyse van hevealatex V. Ammoniak, aminen en betainen.
(Organic analysis of hevea latex V. Ammonia, amines and betaines.) [English summary.]
Arch. Rubbercult. Ned. Ind., 1941, 25 : 1-13, bibl. 12, being *Meded. Afd. Rubb. Res. Proefst. West-Java* 27.

A method is described for the isolation and identification of nitrogen bases present in fresh unammoniated latex, such as ammonia, amines and betaines. A scheme of the adopted method of analysis is presented in English. [From author's summary.]

305. ALTMAN, R. F. A. 633.912 : 678.11 : 581.192
Organische analyse van hevealatex VI. Alkaloiden in whole-latex rubber.
(Organic analysis of hevea latex VI. Alkaloids in whole-latex rubber.) [English summary.]
Arch. Rubbercult. Ned. Ind., 1941, 25 : 14-7, bibl. 3, being *Meded. Afd. Rubb. Res. Proefst. West-Java* 28.

By the Stas-Otto method it is possible to separate from whole-latex rubber very small quantities of substances having a bitter taste and giving the usual alkaloid and some colour reactions. [Author's summary.] The tables of the reactions are given in English.

306. ALTMAN, R. F. A. 633.912 : 678.11 : 581.192
Organische analyses van hevealatex VII. Vetzuren, harszuren, sterolen, wax-alcoholen. Vooloopige mededeeling. (Preliminary note on the organic analysis of hevea latex VII. Fatty acids, resin acids, sterols, wax alcohols.) [English summary.]
Arch. Rubbercult. Ned. Ind., 1941, 25 : 142-7, bibl. 13, being *Meded. Afd. Rubb. Res. Proefst. West-Java* 30.

Results are given of the analysis of ether soluble non-rubber constituents of fresh unammoniated latex. The adopted method of analysis is outlined in English. [From author's summary.]

307. JOHN, C. M. 634.573-1.56
Industrial uses of cashew and its products.
Trop. Agriculturist, 1941, 97 : 37-9, reprinted from *Madras agric. J.*, 1941, Vol. 29, No. 5.

The recorded uses to which the cashew can be put are collated and the chief of them are given below. The nut is used in a variety of household preparations and has a high biological value. The kernel contains 40% of oil of high nutritive value, superior to olive oil. The shell oil is used in preparation of varnishes and similar products. Anacardic acid, which forms 90% of the corrosive oil, has lately been used as an antiseptic for textiles. The apple has antiscorbutic properties and the invert sugars are valuable for inclusion in infant and invalid foods. Mixed with iron sulphate the juice is said to make a good hair dye. Cashew wood is used for making boats and packing cases. The resinous gum from the bark repels insects and can therefore be used in bookbinding. The sap obtained from incisions on the bark makes an indelible marking ink. The charcoal is much esteemed by local ironsmiths.

308. LAVA, V. G., TORRES, P. E., AND SANVICTORES, S. 634.61-1.56
Chemical studies on coconut products IV.* Further data on a new process for the extraction of coconut oil.
Philipp. J. Sci., 1941, 75 : 143-57, bibl. 1.

The article gives more detailed data on the new process* for the extraction of coconut oil emulsion from the comminuted fresh meat by pressing, breaking this emulsion by regulating its pH or by further dehydration of the protein in the emulsion, and finally separating the oil by mechanical

* III. *Ibidem*, 1941, 74 : 247-83, *H.A.*, 11 : 1486.

means. Further data on the extraction of coconut oil emulsion by the roller mill are given, the factors studied being effects of pressure, water dilution, successive order of pressing and particle size.

309. CHILD, R. 634.61-1.56
The packing and keeping qualities of desiccated coconut.
New Guinea agric. J., 1941, 7: 215-20, reprinted from *Coconut Industries*, 4: 1: 9.

To ensure the keeping of desiccated coconut the initial moisture content must be below 3%, and packing must be such as to exclude moisture from the air. Chest linings should be of grease-proof paper. Loss of oil at high temperatures (above 90° F.) begins to be severe, causing case-staining, which acts as a focus of rancidity due to atmospheric oxidization. Rancidity or "ageing" is also fostered by the action of light especially the shorter rays, blue, violet and ultra-violet, thus a wrapper excluding these is desirable unless the container is already perfectly opaque. Since coconut oil readily absorbs taints, packing cases should be selected with care, avoiding strong resinous wood. A wrapping of metallic foil, e.g. aluminium, is impervious to odours, grease-proof and waxed papers often are not. Instructions are given for packing for wholesale and retail purposes.

310. H., R. C. 634.61-1.57
Preparation of coconut shell charcoal.
New Guinea agric. J., 1941, 7: 204-5.

A method of preparing coconut shell charcoal is described which, it is claimed, has advantages over all other methods previously discussed in the journal. The shells are burnt in 40 gallon oil drums, requiring some easily managed modifications. Much depends on correct stoking. Normal yield is 70-75 lb. of charcoal per drum with volatile matter between 5 and 15%.

311. MACKINNEY, G. 581.175.11
The coloring matters of plants III. Anthocyanins, flavones and related compounds. IV. Miscellaneous plant pigments and types of discoloration.
Fruit Prod. J., 1941, 20: 378-9 and 1941, 21: 18-9.
 For I and II see *Ibidem*, 20: 313-4, 344-5.

BRIGGS, L. H. 633.85
The essential oil of *Araucaria excelsa* (Norfolk Island pine).
J. Soc. chem. Industr., 1941, 60: 222-6.

BRIGGS, L. H. 633.85
The essential oil of *Macropiper excelsum* (Kawakawa).
J. Soc. chem. Industr., 1941, 60: 210-2.

CRUESS, W. V., AND OTHERS. 634.63-1.56
Olive experiments of 1940-41 season.
Fruit Prod. J., 1941, 21: 113-5.
 Results of different processing methods.

BERGERET, G. 634.58-1.56
Manteca de mani. (Peanut butter.) [English summary.]
 Reprinted from *Rev. Asoc. Ing. agrón. Uruguay*, 1941, No. 3, pp. 6, bibl. 5.
 Notes on manufacture and use of peanut butter.

EDWARDS, F. R., AND MASSEY, Z. A. 634.58: 636.084
Peanut meal in livestock production.
Bull. Ga Exp. Stat. 216, 1941, pp. 19.
 Notes on manufacture of peanut meal and of its successful use as stock feed.

WILKINSON, H. 665.353.4
Palm oil carotenoids.* Addendum to paper by Hunter, R. F., and Scott, A. D.
Biochem. J., 1941, 35: 824.

* For previous paper see *Ibidem*, 35: 31-8, noted *H.A.*, 11: 641.

NOTES ON BOOKS AND REPORTS.

312. McLEAN, R. C., AND COOK, W. R. I. 578.6
Plant science formulae.

Macmillan & Co., Ltd., London, 1941, pp. 203, 7s. 6d.

The laboratory worker has frequently to prepare mixtures according to certain receipts that have proved useful in practice, and much time is often spent in tracing particular formulae, for they are scattered in various books and sometimes in out-of-the-way periodicals. The sub-title of *Plant science formulae* is *A Reference book for plant science laboratories (including bacteriology)*, and this indicates what the authors intend the book to be; they say it is not a book for the library but for the laboratory, and if it becomes thumbed and stained "so much the better, for it will be serving its purpose as a book in which to look things up". The botanical worker will find this book most useful for not only are there all the well-tried formulae but also many of the more unusual ones, although "the guiding principle throughout has been to include receipts of proved and established worth rather than those having more specialized value". In addition to the formulae used in preparing plant tissues for microscopical examination there are chapters on Culture and nutrient solutions, Agar and other nutrient solid media, Photographic reagents, and Workshop receipts. Brief notes are given, when considered necessary, on the use and preparation of the mixtures mentioned. The insertion of blank pages at the end of each chapter for additional receipts appears to have been an afterthought for it has made necessary the inclusion of a slip with a number of errata in pagination. Its reasonable price should serve to bring this book into the hands of all workers in botanical and plant pathological laboratories.

H.W.

313. MILSUM, J. N., AND GRIST, D. H. 635.1/7 : 551.566.1
Vegetable gardening in Malaya.
Malayan Planting Manual 3, Dep. Agric. S.S. & F.M.S., Kuala Lumpur, 1941, pp. 206 + 9, 2 dollars.

Earlier publications on vegetables of the Department of Agriculture of Malaya being now out of print the present manual has been issued with a view to bringing the whole question of vegetable production in Malaya under review. The information provided will quite certainly be found to be of value to dwellers not only in Malaya but in the tropics generally. The opening chapters discuss general garden routine. These are followed by chapters on the home garden under lowland conditions, an interesting and instructive account of Chinese market gardening, in which tribute is paid to the success obtained by the painstaking methods of the Chinese, and a chapter on highland vegetable production. Succeeding chapters contain brief but adequate notes on the cultivation of a large number of vegetables, mostly of European origin. Many of these are unsuited to lowland conditions but grow well enough in the higher altitudes available, though heavy rainfall, paucity of flat land and often poor soil render conditions by no means ideal. The chapters dealing with pests and diseases are contributed by the Entomologists and the Senior Pathologist of the Department respectively, while Dr. Leong Peng Chong of the Biochemical Department, College of Medicine, Singapore, has provided an interesting section on food values of vegetables. Malaya still imports over 60,000 tons of vegetables annually, all of which, with the exception of onions and potatoes, could probably be produced in sufficient quantities in the country itself. Although this might not be economic in peace there is no doubt that self-sufficiency is important in times of war. The book can be recommended as good reading to horticulturists in any clime whose vision extends further than their own cabbage patch.

314. U.S. DEPARTMENT OF AGRICULTURE. 63
Farmers in a changing world. Yearbook of Agriculture 1940.
 Supt. Documents, Washington, D.C., 1941, pp. 1215, \$1.50.

The latest yearbook of the U.S.D.A. is devoted entirely to the social and economic history of American agriculture from the time of the early settlers to the outbreak of the present war. Its 54 articles are roughly classified as follows:—(1) *The farmer's changing world*, e.g. American agriculture—the first 300 years. (2) *Agriculture and the national welfare*, e.g. Agricultural surpluses and nutritional deficits. (3) *The farmer's problems to-day and the efforts to solve them*, e.g. Our soil can be saved, and Rural electrification. (4) *Farm organizations*. (5) *What social*

scientists have to say, e.g. Education for rural life. (6) *Democracy and agricultural policy*, e.g. Science and agricultural policy. (7) *Essentials of agricultural policy*.

315. LEONARD HILL LTD. 664.84 + 664.85

Food industries manual 1941.

Leonard Hill, Ltd., Stratford Place, London, pp. 232, 1941, 15s.

In this eleventh edition of the manual chief interest for the horticulturist lies in the two following sections. *Canning and preserving*, compiled by F. Hirst and W. B. Adam and others, and *Food storage and refrigeration*. In the former notes are given on the most important points which need attention when canning particular fruits and vegetables and on necessary processes such as blanching, can-closing, on apparatus such as retorts, etc., on particular problems such as hydrogen swells, discoloration of cans or contents, spoilage in general. The section dealing with cold storage is rather more sketchy but contains useful general recommendations as to temperatures appropriate for the storage of different fruits and of gas mixtures recommended for the storage of 10 apple varieties by the Department of Scientific and Industrial Research.

In the final section tables are given of the composition of a large number of foodstuffs including the more common vegetables and fruits according to the protein, fat, carbohydrate and calories per 100 gm. content. The research worker is likely to demand more frequent and exact references to original work than those given here, but to the manufacturer wanting quick information on general technical detail or on firms from whom he can get different apparatus the manual should be of great use.

316. HEWER, D. G. 633.8

Practical herb growing.

G. Bell & Sons, London, 1941, pp. 95, 3s. 6d.

In these days when everyone is imbued with the desire to grow something useful the cultivation of herbs either on a modest commercial scale or seriously in the garden offers attractive and interesting possibilities. Those so minded will find in this little book a very practical and helpful guide. The author is well qualified. She owns a flourishing herb farm, possesses a scientific degree and can express herself lucidly in few words. Hence assuming complete ignorance on the part of the reader she contrives as a start to tell him in some nine pages all he needs to know for practical purposes of soils, fertilizers, manures and composts, with quite a useful slice of plant physiology thrown in by way of explaining how it all works. Instructions on propagation, cultivation and harvesting are equally terse and to the point. Drying of herbs is treated at greater length for the good reason that unless properly carried out all the care and trouble expended on growing the plants will have been in vain. A drying shed is almost a necessity and the construction of this and its furnishing with the necessary appliances is described and illustrated very fully. In the matter of fittings the author is able to give concrete effect to her talent for compression by the introduction of a number of space and labour saving devices which are not only ingenious but simple enough to be put together by anyone even only moderately handy with hammer and saw. There are chapters on the general uses of herbs and the layout and planting of a herb garden and farm. The latter half of the book consists of short notes on individual herbs in which their uses, propagation, cultivation and method of preparation for sale are adequately treated. There are too many gardening books and quite a number would serve their country better in the pulping machine than on the bookshelf, but this is not one of them. It fills a gap and does it well.

317. SHEWELL-COOPER, W. E. 631.544.1 : 635.1/7 + 635.9 + 634.7

Continuous cloche gardening.

The English Universities Press, London, 1941, pp. 96, 1s.

After stressing the advantages possessed by the modern tent- and barn-pattern cloche over the old-fashioned French bell jar, in that no special manuring or ventilation is required, the author gives remarkably precise directions for every phase of cloche cultivation as applied—it seems to the reviewer—to every conceivable vegetable and the more common herbs normally grown with varying success in the open in England. He does not stop at vegetables but gives rather more general directions for growing annual, biennial, perennial and bulb-rooted flowers under

cloches and detailed descriptions of the similar cultivation of strawberries and raspberries and the training necessary in the case of the latter and of loganberries and blackberries. Finally, after discussing the use of cloches for raising cuttings he devotes a section to the pests and diseases likely to attack cloche-grown crops in particular. A chart is given of the results to be expected with particular varieties in Kent and Surrey, a cropping scheme is suggested for various sized cloches and there is an index. Although the reviewer would feel happier if the author had definitely stated that his recommendations are based on practical experience or experimental results he is grateful for the many definite instructions given in concise and readable form and at so reasonable a cost on the modern adaptation to English conditions of an old and useful continental practice.

318. CHILEAN NITRATE EDUCATIONAL BUREAU INC. 632.19 : 631.454
If they could speak.
 Chilean Nitrate Educational Bureau, Inc., 120 Broadway, New York, 1941,
 pp. 54.

This booklet consists of less than 1,000 words of letterpress, and 94 coloured illustrations, most of which are excellent. It begins with a plea for the use of naturally occurring plant nutrients especially Chilean nitrate of soda, with their accompanying traces of essential minor elements. "The purpose of this handbook," to quote from it, "is to provide aid, by means of faithful reproduction of colour photographs, in observing and identifying characteristic symptoms of plant food deficiencies." It gives a good idea of the types of symptoms associated with various mineral deficiencies, but it is misleading in that it gives no idea of the difficulties and uncertainties in the identification of mineral deficiencies by observation of symptoms alone. There is by no means general agreement on this question. Symptoms of the same deficiencies vary somewhat from variety to variety of the same species and they are affected greatly by deficiencies of other elements, the combined effect not always being the sum of the two. Symptoms of different deficiencies are often similar. There is at present no general agreement as to how far deficiencies can be identified by observation of symptoms alone.

W.A.R.

319. ALGEMEEN LANDBOUW SYNDICAAT, DUTCH EAST INDIES. 633/635
Verslag over het jaar 1940 van het Algemeen Landbouw Syndicaat enz. (Report for 1940 of the Algemeen Landbouw Syndicate and others.) Ruygrok & Co., Batavia, 1941, pp. 282.

A combined annual report of the agricultural and horticultural research stations and their satellite associations in the Dutch East Indies. The reports are largely concerned with administration, but in some cases results of completed experiments are briefly alluded to in general terms.

320. AMANI. 633/635 : 551.566.1
Thirteenth Annual Report East African Agricultural Research Station for 1940, 1941, pp. 22. H.M. Stationery Office, London, 6d.

The Amani research programme was modified in order to conduct special investigations on the local production and utilization of certain products in connexion with the war. Results are not reported here. Investigations not directly bearing on the war were as follows. *Cassava* improvement, including the breeding of mosaic resistant varieties. *Coffee*. Study of overbearing and its complex carbohydrate problem; interspecific crossing. *Fibre crop* trials, particularly with hybrids of which the most promising are the *Agave angustifolia* × *A. amaniensis* hybrids. *Tung*. Trials of *Aleurites montana* seedlings from high yielding trees. *Derris*. Manurial, spacing, hormone effect and continuous cropping trials. Some native food crops were also studied with a view to improvement.

321. BUREAU OF CHEMISTRY, CALIFORNIA. 631.8 + 632.95
Annual Report of the Bureau of Chemistry for 1940, 1941, pp. 43.

The report deals in turn with Fertilizing materials, Economic poisons (including new spray stuffs), Spray residue enforcement, and Spray residue certification.

322. CANADA. 634/635
Report of the Minister of Agriculture, Canada, for the year ended March 31, 1941, 1941, pp. 171, 50 cents.

Nearly every section of this report contains matter interesting to horticulturists set out in concise but readable form. *The Division of Horticulture* reports the following progress. Apple juice manufacture appears to be commercially established. There is a great increase in apple sauce production and marketing under government label. Distilled cider vinegar is meeting with a ready response. Studies are being continued on vitamin content in fresh and preserved vegetables. Cold storage investigations include trials of small containers for apple storage and marketing and gas storage of Bartlett pears. Foundation stocks of vegetable seed are increasing. Plant nutritional studies include work on magnesium deficiency and cultural practice. Rootstock and tree building studies continue. The use of hormone sprays to prevent premature fruit fall in apples is now recommended to growers. Reports of work at *Branch Farms and Stations* include notes on progress made. The most interesting to the horticulturist are those from the following stations:—Kentville, N.S., Fredericton, N.B., Morden, Man., Summerland, B.C., Agassiz, B.C., Saanichton, B.C.

323. CEYLON, DIRECTOR OF AGRICULTURE. 634/635
Administration Report of the Acting Director of Agriculture, Ceylon, for 1940, Part IV. Education, Science and Art (D), 1941, pp. 18, 30 cents.

Horticulture. Foster, Triumph and Marsh Seedless grapefruits, but not Walters, were incompatible with pummelo as rootstock. All four varieties did well on rough lemon. On other stocks performances of Foster and Triumph were erratic. *Botany.* Brief mention is made of work in progress on castor, kurukkan (*Eleusine coracana*), pineapple, sugarcane, cotton, kapok, cinchona, areca, betel, cassava, potatoes and vegetables. Reports are also presented in brief by the departments of entomology, plant pathology and chemistry.

324. CEYLON, RUBBER RESEARCH BOARD. 633.912
Report of the work of the Rubber Research Board, Ceylon, in 1940, 1941, pp. 123.

The activities of the various Technical Officers for the past year are briefly set out. Much of this has already been published and abstracted. The Chairman's report and the financial statement are included.

325. NATIONAL AGRICULTURAL RESEARCH BUREAU, CHUNGKING. 633/635
Report of the National Agricultural Research Bureau for 1938.
Misc. Publ. nat. agric. Res. Bur. 8, 1939, pp. 21 (received 1 January, 1942).

The report gives a brief history of the National Agricultural Research Bureau of China, and its journey [Odyssey would be a better word] to West China in face of Japanese aggression. Wherever the Bureau temporarily settled on its difficult journey it contrived to initiate important projects for the improvement of local agriculture. To give an example of the ingenuity which often had to be exercised the absence of thermometers for use in the hot water treatment for control of smut in wheat was overcome by the construction of an instrument containing oils and waxes, the differential of their melting points recording temperature with a fair amount of accuracy. The cheapness and ease of manipulation of these instruments make them well suited to use by farmers.

326. GEORGIA. 633/635
Fifty-third Annual Report Georgia Experiment Station for the year 1940-41, 1941, pp. 161.

A number of plant diseases affecting pepper (pimiento), peanut, tomatoes, watermelons, etc., are discussed in the *Botany* section. Under *Chemistry* are found peach storage studies, peanut composition. *Food Processing.* Notes are given on freezing lima beans, demonstration travelling freezing plant, peach peeling, processing peanuts. *Horticulture.* Work is reported on squash breeding, collard breeding, asparagus cultivation, the planting, varieties, curing and storage of sweet potatoes, the use of a booster (fertilizer) solution when transplanting pimiento,

longevity in peaches—factors shortening life are winter injury, borer injury and soil erosion—peach cover crops, peach roots, rootstocks for American grapes. Work at the Mountain Experiment Station, Blairsville, concerns herb, fruit and vegetable production.

327. COFFEE BOARD OF KENYA. 633/73
Annual Report of the Board for the year ended 30th June, 1941,
 1941, pp. 30.

The report deals with administration and accounts. There is a chapter by Mr. S. Gillett outlining the recent work of the "Coffee Team".

328. MALAYA. (BELGRAVE, W. N. v.) 63
Report on agriculture in Malaya for the year 1940, 1941, pp. 14,
 1 dollar.

A very brief résumé is given of the agricultural conditions obtaining in 1940. Most of the information has already been published elsewhere and noticed in *Horticultural Abstracts*.

329. NEW ZEALAND. 634/635
Annual Report of the Department of Agriculture, N.Z., for 1940-41,
 1941, pp. 48, 1s.

The attempt to absorb internally the exportable surplus of apples and pears has meant increased attention to fruit storage. Standardization of apple and pear marketing has been adopted. Fruit processing, jamming, drying and canning have increased. Experiments conducted by the Horticultural Division in collaboration with the D.S.I.R. are (1) long cool storage of Granny Smith apples, (2) orchard storage of apples, (3) stone fruit rootstocks, (4) hazel nut cultivation, (5) seedling apple trials, (6) the cultivation of kumaras. Wine making is progressing favourably and it is thought N. Zealand production should, in a few years, go far to satisfying the requirements of New Zealand. The Te Kauwhata Horticultural Station has brought its wine making apparatus up to date and continues to sell more wine. Brief notes are given on hop and tobacco culture and on beekeeping.

330. PUERTO RICO. 63/65
Informe bienial Estac. exp. agric. Rio Piedras (Biennial Report of the Puerto Rico Agricultural Experiment Station, Rio Piedras, 1938/40.) pp. 139.

A general account of the work of the experiment station is first given, and this is followed by brief accounts of the work done on a great number of crops. Many of the results obtained have already been reported more fully in the annual reports which are issued in English and those of interest to this Bureau have been abstracted.

331. QUEENSLAND. 633/635
Report of the Director of Plant Industry (Research) Queensland,
 1941, pp. 5.

Horticultural breeding work. This includes pineapple selection, papaw investigations, improved Phenomenal strawberry, disease-free tomatoes. *Tobacco*, varietal trials. *Deciduous fruits.* The influence of soil moisture and organic content on nutritional problems in apple and pear in the Stanthorpe district. "Hen and chicken" phenomenon in Waltham Cross grapes and its association in part with boron deficiency. *Tropical and subtropical fruits.* Banana and citrus nutrition. Small fruit and poor setting in papaws. Minor element deficiencies in passion fruit. *Pineapple investigations.* A large scale experiment to investigate the rôle of minor elements in pineapple nutrition has been laid down at Glasshouse Mountains. It has been found possible to correct the crookneck condition by very small soil applications of zinc sulphate and copper sulphate, neither of these being entirely effective when given alone. The black heart investigations are yielding results, freedom from it having been obtained in controlled experiments. Fertilizer trials which should be completed in 1943 are already giving interesting results. There

* H.A., 10: 1411, 1412, 1438 and H.A., 11: 1520.

was further work on forcing blossoming by the application of acetylene. *Vegetable investigations.* Bean fertilizer trials have been successful. Field work showed the success of substances containing boron for heart rot of beetroot. *Essential drug plants.* Work in progress at Nambour in connexion with the C.S.I.R. Notes are also given of plant protection work and on botanical and soil investigations.

332. SIERRA LEONE.

63

Annual Report of the Department of Agriculture, Sierra Leone for 1939, 1941, pp. 15.

An agricultural policy has been laid down by the government on the following lines. A. Adequate provision of food for the people. B. The cultivation of money crops or exploitation of wild trees for export purposes. C. Forest improvement. D. Improvement in the preparation and marketing of produce. E. Preservation of the standard of export produce by inspection. F. Co-operation with Education Department where possible in the teaching of agriculture. G. Research. H. Soil conservation. I. Nutrition. J. Extension work. Progress achieved is briefly noted. The efforts rendered necessary by the war involve the proper development of agriculture in one or other direction and therefore will not be wasted.

333. S.S. AND F.M.S. DEPARTMENT OF AGRICULTURE.

664.85.774.036.5

Quarterly report on the Malayan pineapple canning industry March to May 1941.

Malay. agric. J., 1941, 29 : 283-5.

This report was prepared by the Economics Branch. Research on the manufacture of pineapple jam has shown a mixture of pineapple and papaya with lime juice to be the most successful combination. Some improvements were effected in locally made cans. Rubber compound for can sealing, hitherto only obtainable in U.S.A. has been manufactured by a firm in England and has proved very satisfactory. British-made lacquers proved successful as an exterior protection against rusting of cans. The flavour of pineapple juice is improved by careful selection and blending of certain types of fruit. Rigid control is necessary to maintain consistent quality. Investigations on the dispersal of sediment have been unsuccessful so far. Pineapple pulp was successfully preserved with sodium bisulphite for export. Experiments on the production of dried pineapple were only partly successful.

334. TEXAS.

634/635

Fifty-third Annual Report Texas Agricultural Experiment Station 1940, 1941, pp. 294.

A mass of information is given on the organization and work of the Texas station and its sub-stations. General horticultural projects are considered on pp. 20-36. They include work at the Fruit Investigations Laboratory, Montague, and at the Sweet Potato Investigations Laboratory, Gilmer. Later work at the different sub-stations is considered separately and in rather more detail. The sub-stations concerned on a large scale with horticultural work include *Angleton* : grapes, figs, grape juice. *Nacogdoches* : blackberries and dewberries, peach insects and pests, adaptability tests of deciduous tree fruits. *Jacksonville* : tomato diseases. *Weslaco* : citrus and all its problems, date palms, papayas, bananas, pecans, grapes, strawberries, cruciferous vegetables, tomatoes, potatoes, sweet potatoes, snap beans, ornamentals. *Iowa Park* : fruit adaptability tests, peaches, strawberries, vegetables, ornamentals. *Winter Haven* : adaptability tests of deciduous fruit trees, citrus varieties and rootstocks, grapes, strawberries, vegetables, plant diseases.

335. IMPERIAL COLLEGE OF TROPICAL AGRICULTURE, TRINIDAD.

633/635

Report of Governing Body and Principal's Report to December 31st 1940. St. Augustine, Trinidad, and Broadway Buildings, London, S.W.1, 1941, pp. 32.

In addition to the administration reports and accounts short reports are included from the heads of the various scientific departments on the work done and some of the results achieved. A list is given of scientific papers published during 1940.

336. WAITE INSTITUTE.

633/635

**Report of the Waite Agricultural Research Institute, South Australia
1939-40, 1941, pp. 83.**

Though most of this report does not directly concern horticulture it contains notes of certain studies which are of interest to horticulturists, namely physiological studies of the tobacco plant, rind blemish in oranges, a grape vine disease slightly resembling court noué, bacterial wilt and leaf mould disease of tomato, the grape vine webbing moth (*Tenuipalpus californicus*), gladiolus thrips (*Taeniothrips simplex*), insects infesting stored foods including fruits.

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The annual reports and other publications listed below have also been examined:—

A.R. Dep. Sci. Agric. Barbados for 1939-40, 1941, pp. 14.

Rep. Dep. Agric. Brit. Honduras for 1940, 1941, pp. 6.

Tenth A.R. Minist. Agric. Eiré 1940-41, Dublin, 1941, pp. 86, 3s. 6d.

Malayan Agricultural Statistics (GRIST, D. H.), 1940.

Econ. Ser. Bull. Dep. Agric. S.S. and F.M.S. 12, 1940, pp. 106, 1 dollar.

A.R. Dep. Agric. Mauritius for 1940, 1941, pp. 28, 35 cents.

Mysore Agricultural Calendar for the year Vishu (April 1941-March 1942), 1941, pp. 164, 2 annas.

Fifty-fourth A.R. Nebraska agric. Exp. Stat. for 1940, 1941, pp. 78.

TEXAS (JACKSON, A. D.).

Abstracts of Bulletins Nos. 581-595, Circulars Nos. 86-90 and other publications during 1940.

Circ. Tex. agric. Exp. Stat. 93, 1941, pp. 50.